CHAPTER ONE

GENERAL INFORMATION

The troubleshooting, maintenance, tune-up, and step-by-step repair procedures in this book are written specifically for the owner and home mechanic. The text is accompanied by helpful photos and diagrams to make the job as clear and correct as possible.

Troubleshooting, maintenance, tune-up, and repair are not difficult if you know what to do and what tools and equipment to use. Anyone of average intelligence, with some mechanical ability, and not afraid to get their hands dirty can perform most of the procedures in this book.

In some cases, a repair job may require tools or skills not reasonably expected of the home mechanic. These procedures are noted in each chapter and it is recommended that you take the job to your dealer, a competent mechanic, or a machine shop.

MANUAL ORGANIZATION

This chapter provides general information, safety and service hints. Also included are lists of recommended shop and emergency tools as well as a brief description of troubleshooting and tune-up equipment.

Chapter Two provides methods and suggestions for quick and accurate diagnosis and repair of problems. Troubleshooting procedures discuss typical symptoms and logical methods to pinpoint the trouble.

Chapter Three explains all periodic lubrication and routine maintenance necessary to keep your motorcycle running well. Chapter Three also includes recommended tune-up procedures, eliminating the need to constantly consult chapters on the various subassemblies.

Subsequent chapters cover specific systems such as the engine, transmission, and electrical system. Each of these chapters provides disassembly, inspection, repair, and assembly procedures in a simple step-by-step format. If a repair is impractical for the home mechanic it is indicated. In these cases it is usually faster and less expensive to have the repairs made by a dealer or competent repair shop. Essential specifications are included in the appropriate chapters.

When special tools are required to perform a task included in this manual, the tools are illustrated. It may be possible to borrow or rent these tools. The inventive mechanic may also be able to find a suitable substitute in his tool box, or to fabricate one.

The terms NOTE, CAUTION, and WARNING have specific meanings in this manual. A NOTE provides additional or explanatory information. A

CAUTION is used to emphasize areas where equipment damage could result if proper precautions are not taken. A WARNING is used to stress those areas where personal injury or death could result from negligence, in addition to possible mechanical damage.

SERVICE HINTS

Time, effort, and frustration will be saved and possible injury will be prevented if you observe the following practices.

Most of the service procedures covered are straightforward and can be performed by anyone reasonably handy with tools. It is suggested, however, that you consider your own capabilities carefully before attempting any operation involving major disassembly of the engine.

Some operations, for example, require the use of a press. It would be wiser to have these performed by a shop equipped for such work, rather than to try to do the job yourself with makeshift equipment. Other procedures require precision measurements. Unless you have the skills and equipment required, it would be better to have a qualified repair shop make the measurements for you.

Repairs go much faster and easier if the parts that will be worked on are clean before you begin. There are special cleaners for washing the engine and related parts. Brush or spray on the cleaning solution, let stand, then rinse it away with a garden hose. Clean all oily or greasy parts with cleaning solvent as you remove them.

WARNING

Never use gasoline as a cleaning agent. It presents an extreme fire hazard. Be sure to work in a well-ventilated area when using cleaning solvent. Keep a fire extinguisher, rated for gasoline fires, handy in any case.

Much of the labor charge for repairs made by dealers is for the removal and disassembly of other parts to reach the defective unit. It is frequently possible to perform the preliminary operations yourself and then take the defective unit in to the dealer for repair, at considerable savings.

Once you have decided to tackle the job yourself, make sure you locate the appropriate section in this manual, and read it entirely. Study the illustrations and text until you have a good idea of what is involved in completing the job satisfactorily. If special tools are required, make arrangements to get them before you start. Also, purchase any known defective parts prior to starting on the procedure. It is frustrating and time-consuming to get partially into a job and then be unable to complete it.

Simple wiring checks can be easily made at home, but knowledge of electronics is almost a necessity for performing tests with complicated electronic testing gear.

During disassembly of parts keep a few general cautions in mind. Force is rarely needed to get things apart. If parts are a tight fit, like a bearing in a case, there is usually a tool designed to separate them. Never use a screwdriver to pry apart parts with machined surfaces such as cylinder head or crankcase halves. You will mar the surfaces and end up with leaks.

Make diagrams wherever similar-appearing parts are found. You may think you can remember where everything came from — but mistakes are costly. There is also the possibility you may get sidetracked and not return to work for days or even weeks — in which interval, carefully laid out parts may have become disturbed.

Tag all similar internal parts for location, and mark all mating parts for position. Record number and thickness of any shims as they are removed. Small parts such as bolts can be identified by placing them in plastic sandwich bags that are sealed and labeled with masking tape.

Wiring should be tagged with masking tape and marked as each wire is removed. Again, do not rely on memory alone.

Disconnect battery ground cable before working near electrical connections and before disconnecting wires. Never run the engine with the battery disconnected; the alternator could be seriously damaged.

Protect finished surfaces from physical damage or corrosion. Keep gasoline and brake fluid off painted surfaces.

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Protect finished surfaces from physical damage or corrosion. Keep gasoline and brake fluid off painted surfaces.

Frozen or very tight bolts and screws can often be loosened by soaking with penetrating oil like Liquid Wrench or WD-40, then sharply striking the bolt head a few times with a hammer and punch (or screwdriver for screws). Avoid heat unless absolutely necessary, since it may melt, warp, or remove the temper from many parts.

Avoid flames or sparks when working near a charging battery or flammable liquids, such as gasoline.

No parts, except those assembled with a press fit, require unusual force during assembly. If a part is hard to remove or install, find out why before proceeding.

Cover all openings after removing parts to keep dirt, small tools, etc., from falling in.

When assembling two parts, start all fasteners, then tighten evenly.

Wiring connections and brake shoes, drums, pads, and discs and contact surfaces in dry clutches should be kept clean and free of grease and oil.

When assembling parts, be sure all shims and washers are replaced exactly as they came out.

Whenever a rotating part butts against a stationary part, look for a shim or washer. Use new gaskets if there is any doubt about the condition of old ones. Generally, you should apply gasket cement to one mating surface only, so the parts may be easily disassembled in the future. A thin coat of oil on gaskets helps them seal effectively.

Heavy grease can be used to hold small parts in place if they tend to fall out during assembly. However, keep grease and oil away from electrical, clutch, and brake components.

High spots may be sanded off a piston with sandpaper, but emery cloth and oil do a much more professional job.

Carburetors are best cleaned by disassembling them and soaking the parts in a commercial carburetor cleaner. Never soak gaskets and rubber parts in these cleaners. Never use wire to clean out jets and air passages; they are easily damaged. Use compressed air to blow out the carburetor, but only if the float has been removed first.

Take your time and do the job right. Do not forget that a newly rebuilt engine must be broken in the same as a new one. Refer to your owner's manual for the proper break-in procedures.

SAFETY FIRST

Professional mechanics can work for years and never sustain a serious injury. If you observe a few rules of common sense and safety, you can enjoy many safe hours servicing your motorcycle. You could hurt yourself or damage the motorcycle if you ignore these rules.

1. Never use gasoline as a cleaning solvent.
2. Never smoke or use a torch in the vicinity of flammable liquids such as cleaning solvent in open containers.
3. Never smoke or use a torch in an area where batteries are being charged. Highly explosive hydrogen gas is formed during the charging process.
4. Use the proper sized wrenches to avoid damage to nuts and injury to yourself.
5. When loosening a tight or stuck nut, be guided by what would happen if the wrench should slip. Protect yourself accordingly.
6. Keep your work area clean and uncluttered.
7. Wear safety goggles during all operations involving drilling, grinding, or use of a cold chisel.
8. Never use worn tools.
9. Keep a fire extinguisher handy and be sure it is rated for gasoline (Class B) and electrical (Class C) fires.

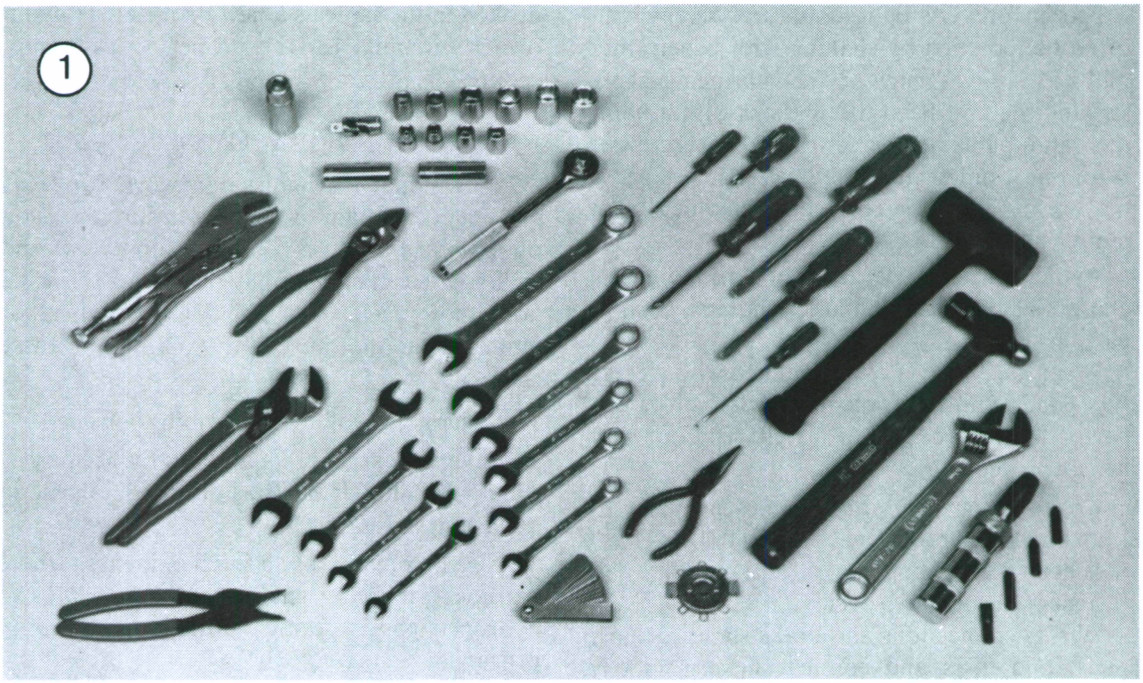
EXPENDABLE SUPPLIES

Certain expendable supplies are necessary. These include grease, oil, gasket cement, wiping rags, cleaning solvent, and distilled water. Also, special locking compounds, silicone lubricants, and engine and carburetor cleaners may be useful. Cleaning solvent is available at most service stations and distilled water for the battery is available at supermarkets.

SHOP TOOLS

For complete servicing and repair you will need an assortment of ordinary hand tools (**Figure 1**).

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As a minimum, these include:

a. Combination wrenches
b. Sockets
c. Plastic mallet
d. Small hammer
e. Impact driver
f. Snap ring pliers
g. Gas pliers
h. Phillips screwdrivers
i. Slot (common) screwdrivers
j. Feeler gauges
k. Spark plug gauge
l. Spark plug wrench

Special tools required are shown in the chapters covering the particular repair in which they are used.

Engine tune-up and troubleshooting procedures require other special tools and equipment. These are described in detail in the following sections.

EMERGENCY TOOL KITS

Highway

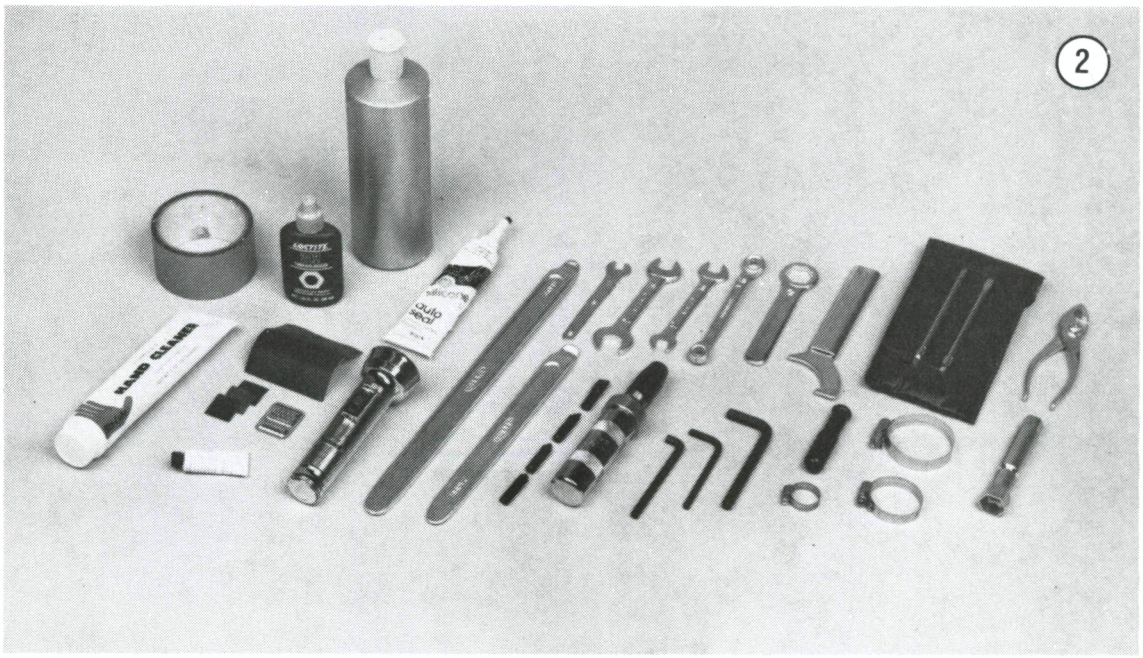
A small emergency tool kit kept on the bike is handy for road emergencies which otherwise could leave you stranded. The tools and spares listed below and shown in **Figure 2** will let you handle most roadside repairs.

a. Motorcycle tool kit (original equipment)
b. Impact driver
c. Silver waterproof sealing tape (duct tape)
d. Hose-clamps (3 sizes)
e. Silicone sealer
f. Lock 'N' Seal
g. Flashlight
h. Tire patch kit
i. Tire irons
j. Plastic pint bottle (for oil)
k. Waterless hand cleaner
l. Rags for clean up

Off-Road

A few simple tools and aids carried on the motorcycle can mean the difference between walking or riding back to camp or to where repairs can be made. See **Figure 3**.

A few essential spare parts carried in your truck or van can prevent a day or weekend of trail riding from being spoiled. See **Figure 4**.



On the Motorcycle

a. Motorcycle tool kit (original equipment)
b. Drive chain master link
c. Tow line
d. Spark plug
e. Spark plug wrench
f. Shifter lever
g. Clutch/brake lever
h. Silver waterproof sealing tape (duct tape)
i. Loctite Lock 'N' Seal

In the Truck

a. Control cables (throttle, clutch, brake)
b. Silicone sealer
c. Tire patch kit
d. Tire irons
e. Tire pump
f. Impact driver
g. Oil

WARNING

Tools and spares should be carried on the motorcycle — not in clothing where a simple fall could result in serious injury from a sharp tool.

TROUBLESHOOTING AND TUNE-UP EQUIPMENT

Voltmeter, Ohmmeter, and Ammeter

For testing the ignition or electrical system, a good voltmeter is required. For motorcycle use, an instrument covering 0-20 volts is satisfactory. One which also has a 0-2 volt scale is necessary for testing relays, points, or individual contacts where voltage drops are much smaller. Accuracy should be ± ½ volt.

An ohmmeter measures electrical resistance. This instrument is useful for checking continuity (open and short circuits), and testing fuses and lights.

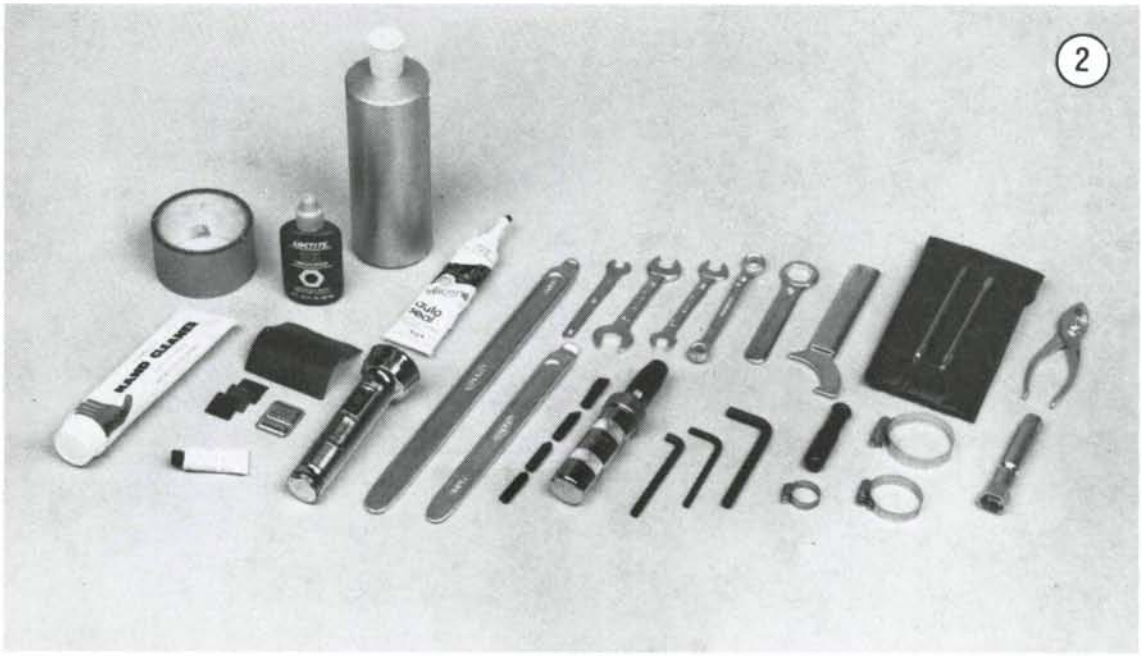
The ammeter measures electrical current. Ammeters for motorcycle use should cover 0-50 amperes and 0-250 amperes. These are useful for checking battery charging and starting current.

Several inexpensive VOM's (volt-ohm-milliammeter) combine all three instruments into one which fits easily in any tool box. See **Figure 5**. However, the ammeter ranges are usually too small for motorcycle work.

Hydrometer

The hydrometer gives a useful indication of battery condition and charge by measuring the

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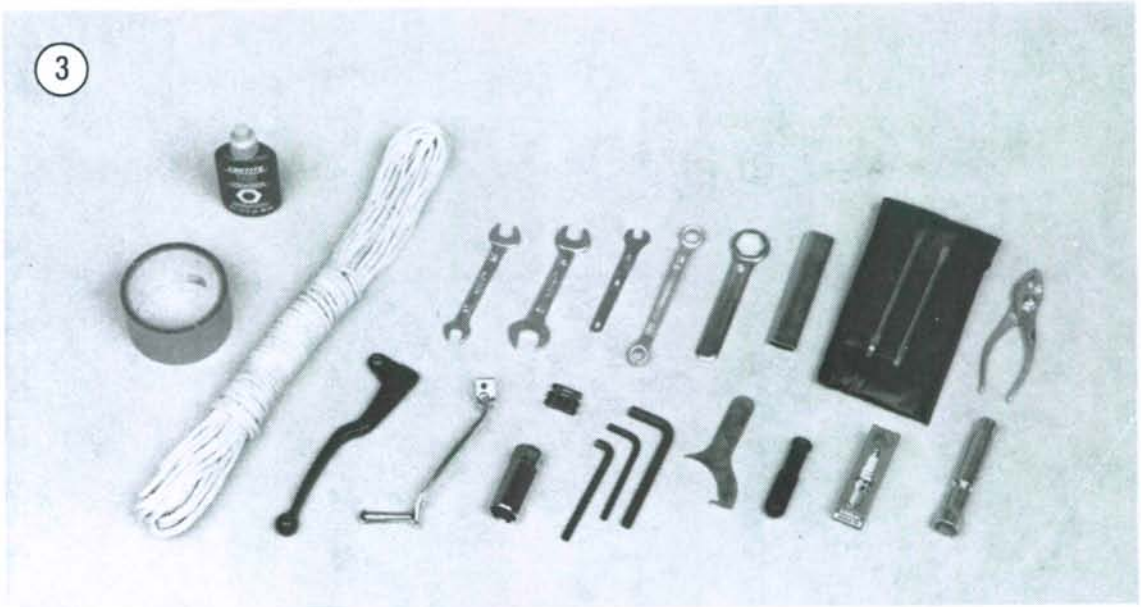
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specific gravity of the electrolyte in each cell. See **Figure 6**. Complete details on use and interpretation of readings are provided in the electrical chapter.

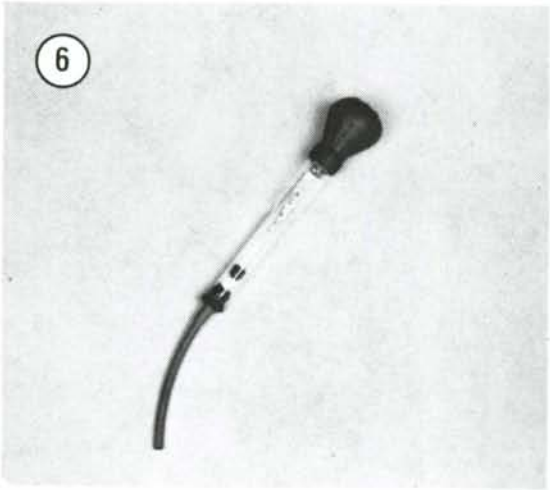
Compression Tester

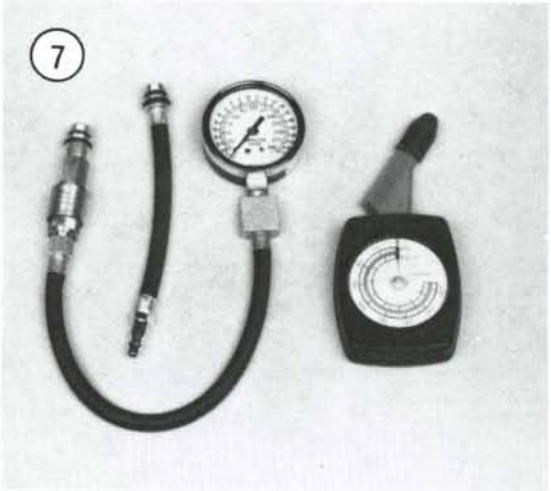
The compression tester measures the compression pressure built up in each cylinder. The results, when properly interpreted, can indicate general cylinder, ring, and valve condition. See **Figure 7**. Extension lines are available for hard-to-reach cylinders.

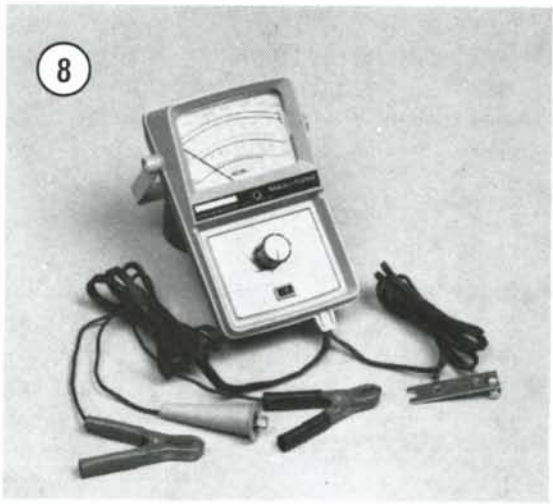
Dwell Meter (Contact Breaker Point Ignition Only)

A dwell meter measures the distance in degrees of cam rotation that the breaker points remain closed while the engine is running. Since









this angle is determined by breaker point gap, dwell angle is an accurate indication of breaker point gap.

Many tachometers intended for tuning and testing incorporate a dwell meter as well. See **Figure 8**. Follow the manufacturer's instructions to measure dwell.

Tachometer

A tachometer is necessary for tuning. See **Figure 8**. Ignition timing and carburetor adjustments must be performed at the specified idle speed. The best instrument for this purpose is one with a low range of 0-1,000 or 0-2,000 rpm for setting idle, and a high range of 0-4,000 or more for setting ignition timing at 3,000 rpm. Extended range (0-6,000 or 0-8,000 rpm) instruments lack accuracy at lower speeds. The instrument should be capable of detecting changes of 25 rpm on the low range.

NOTE: *The motorcycle's tachometer is not accurate enough for correct idle adjustment.*

Strobe Timing Light

This instrument is necessary for tuning, as it permits very accurate ignition timing. The light flashes at precisely the same instant that No. 1 cylinder fires, at which time the timing marks on the engine should align. Refer to Chapter Three for exact location of the timing marks for your engine.

Suitable lights range from inexpensive neon bulb types to powerful xenon strobe lights. See **Figure 9**. Neon timing lights are difficult to see and must be used in dimly lit areas. Xenon strobe timing lights can be used outside in bright sunlight.

Tune-up Kits

Many manufacturers offer kits that combine several useful instruments. Some come in a convenient carry case and are usually less expensive than purchasing one instrument at a time. **Figure 10** shows one of the kits that is available. The prices vary with the number of instruments included in the kit.

Manometer (Carburetor Synchronizer)

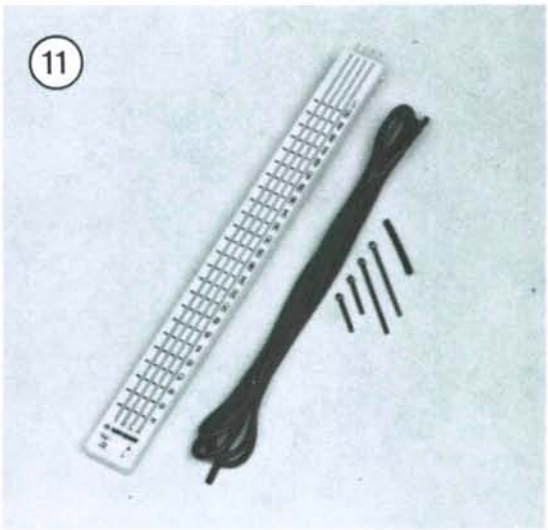
A manometer is essential for accurately synchronizing carburetors on multi-cylinder engines. The instrument detects intake pressure differences between carburetors and permits them to be adjusted equally. A suitable manometer costs about $25 and comes with detailed instructions for use. See **Figure 11**.

Fire Extinguisher

A fire extinguisher is a necessity when working on a vehicle. It should be rated for both *Class B* (flammable liquids — gasoline, oil, paint, etc.) and *Class C* (electrical — wiring, etc.) type fires. It should always be kept within reach. See **Figure 12**.

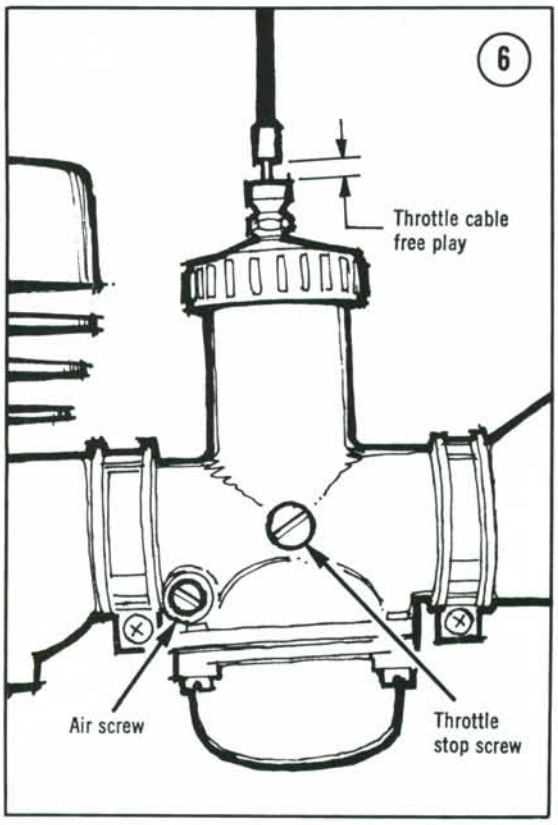


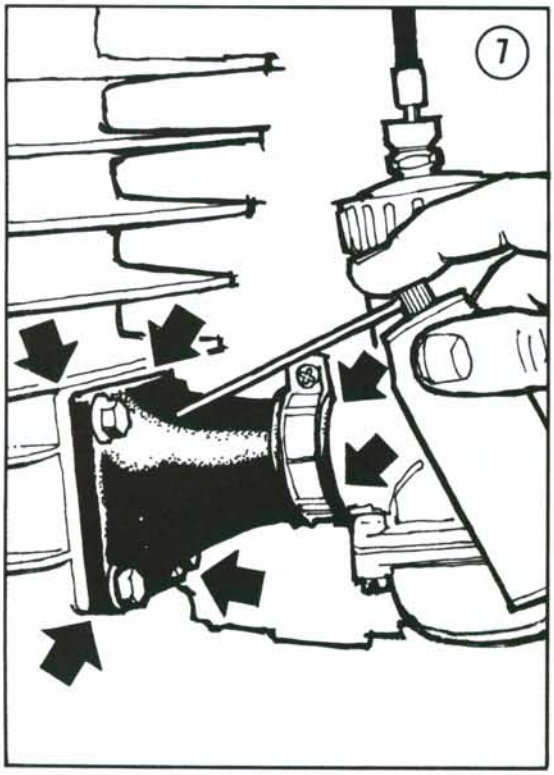






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Crank the engine several times to distribute the oil and test the compression once again. If it is now significantly higher, the rings and bore are worn. If the compression did not change, the valves are not seating correctly. Adjust the valves and check again. If the compression is still low, refer to the engine chapter.

NOTE: *Low compression indicates a developing problem. The condition causing it should be corrected as soon as possible.*

POOR PERFORMANCE

Poor engine performance can be caused by any of a number of things related to carburetion, ignition, and the condition of the sliding and rotating components in the engine. In addition, components such as brakes, clutch, and transmission can cause problems that seem to be related to engine performance, even when the engine is in top running condition.

Poor Idling

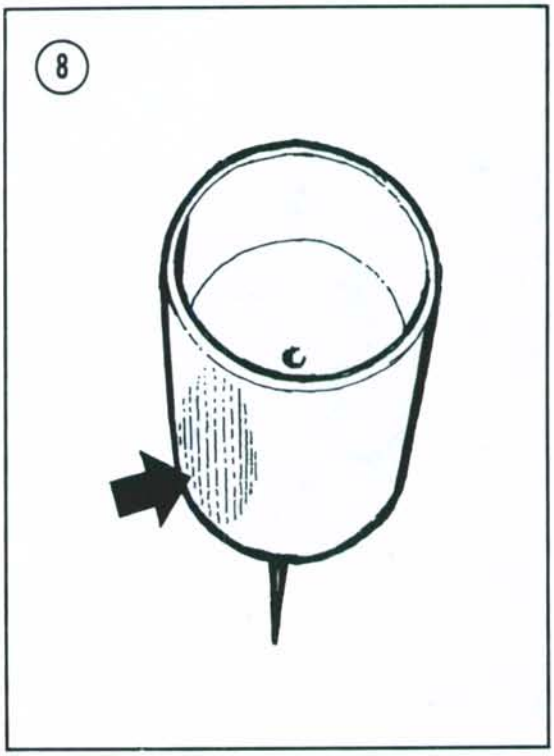
Idling that is erratic, too high, or too low is most often caused by incorrect adjustment of the carburetor idle circuit. Also, a dirty air filter or an obstructed fuel tank vent can affect idle speed. Incorrect ignition timing or worn or faulty ignition components are also good possibilities.

First, make sure the air filter is clean and correctly installed. Then, adjust the throttle cable free play, the throttle stop screw, and the idle mixture air screw **(Figure 6)** as described in the routine maintenance chapter.

If idling is still poor, check the carburetor and manifold mounts for leaks; with the engine warmed up and running, spray WD-40 or a similar light lube around the flanges and joints of the carburetor and manifold **(Figure 7)**. Listen for changes in engine speed. If a leak is present, the idle speed will drop as the lube "plugs" the leak and then pick up again as it is drawn into the engine. Tighten the nuts and clamps and test again. If a leak persists, check for a damaged gasket or a pinhole in the manifold. Minor leaks in manifold hoses can be repaired with silicone sealer, but if cracks or holes are extensive, the manifold should be replaced.

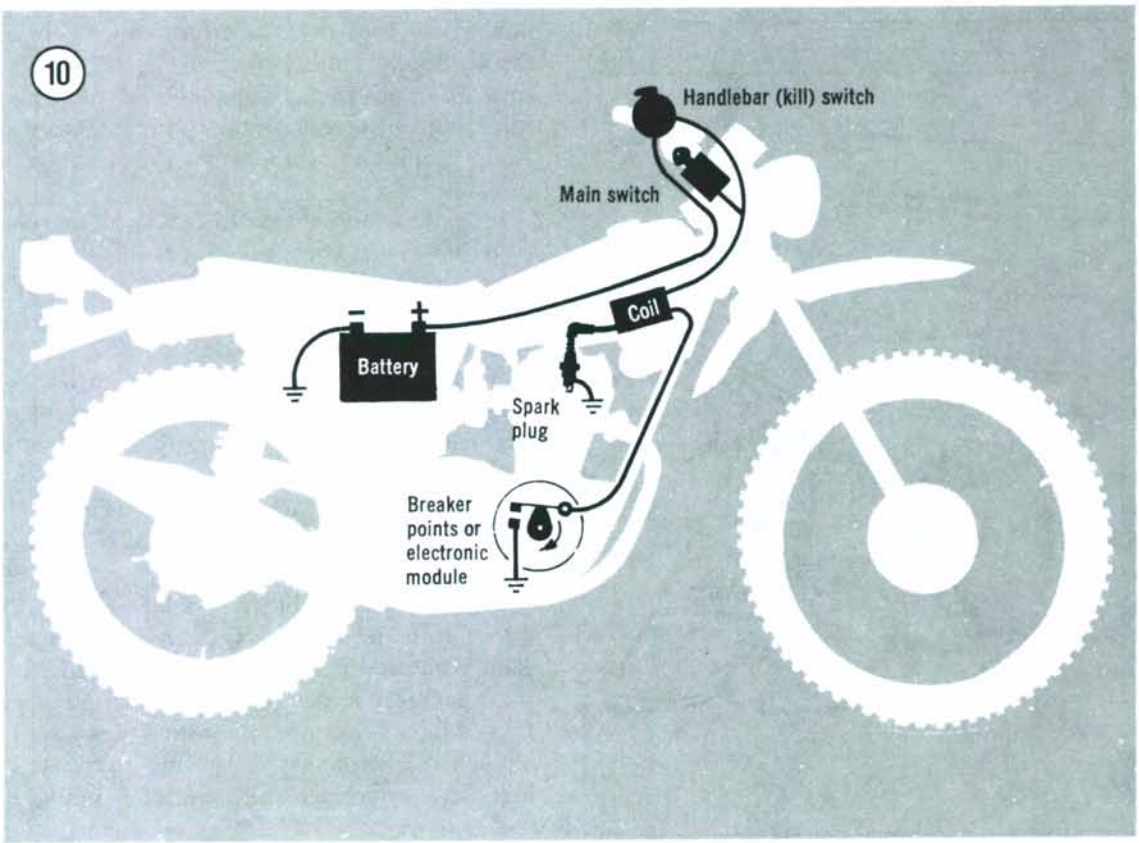
A worn throttle slide may cause erratic running and idling, but this is likely only after many thousands of miles of use. To check, remove the carburetor top and feel for back and forth movement of the slide in the bore; it should be barely perceptible. Inspect the slide for large worn areas and replace it if it is less than perfect (**Figure 8**).

If the fuel system is satisfactory, check ignition timing and breaker point gap (air gap in electronic ignition). Check the condition of the system components as well. Ignition-caused idling problems such as erratic running can be the fault of marginal components. See the electrical system chapter for appropriate tests.



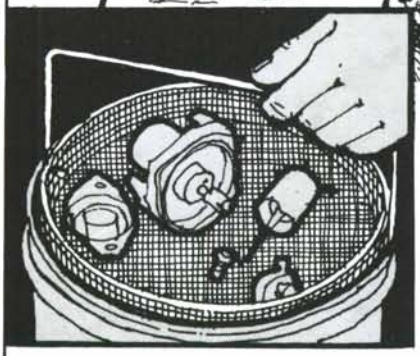
Rough Running or Misfiring

Misfiring (see **Figure 9**) is usually caused by an ignition problem. First, check all ignition connections (**Figure 10**). They should be clean, dry, and tight. Don't forget the kill switch; a loose connection can create an intermittent short.



ENGINE RUNS ROUGH AND MISFIRES





ENGINE MISSES—ALL SPEEDS (9)

+Check ignition wire connections.
+Inspect the insulation on the spark plug high-tension lead for cracking and deterioration.
+Inspect the spark plug for correct heat range and condition.
+Check the point gap and the spring tension on the contact breaker or check electronic module on models with electronic ignition.

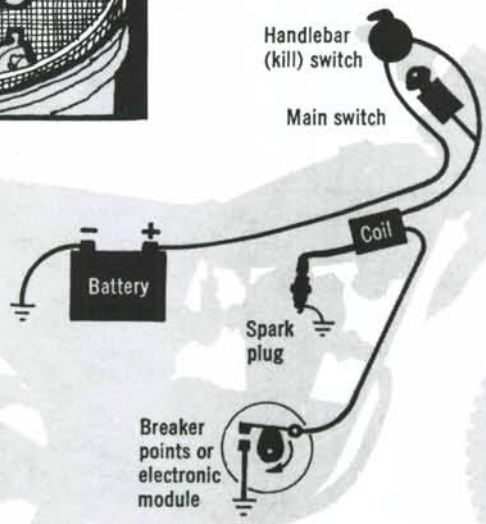
ENGINE MISSES AT LOW SPEED

+Check ignition system (above).
+Clean carburetor—pay particular attention to low-speed jet and circuit.

ENGINE MISSES AT MID-RANGE

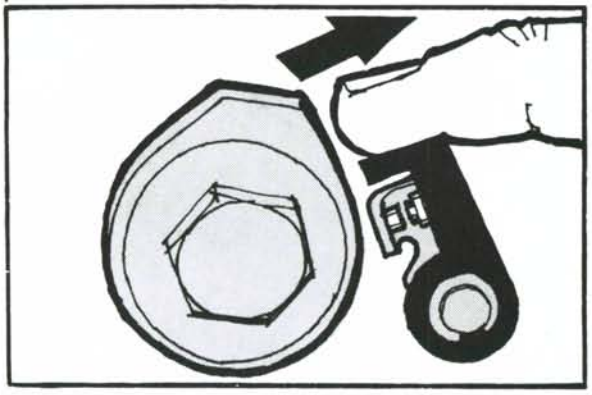
+Check ignition system (above).
+Clean carburetor.
+Check position and condition of slide needle.



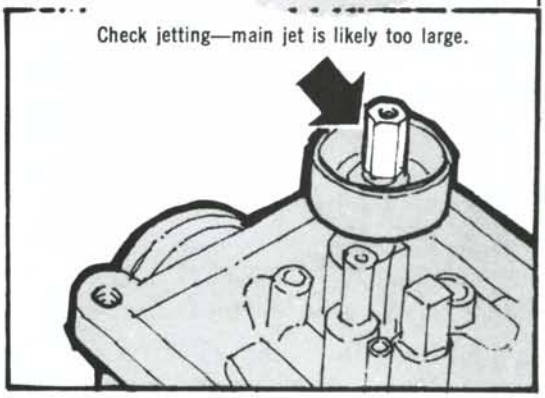


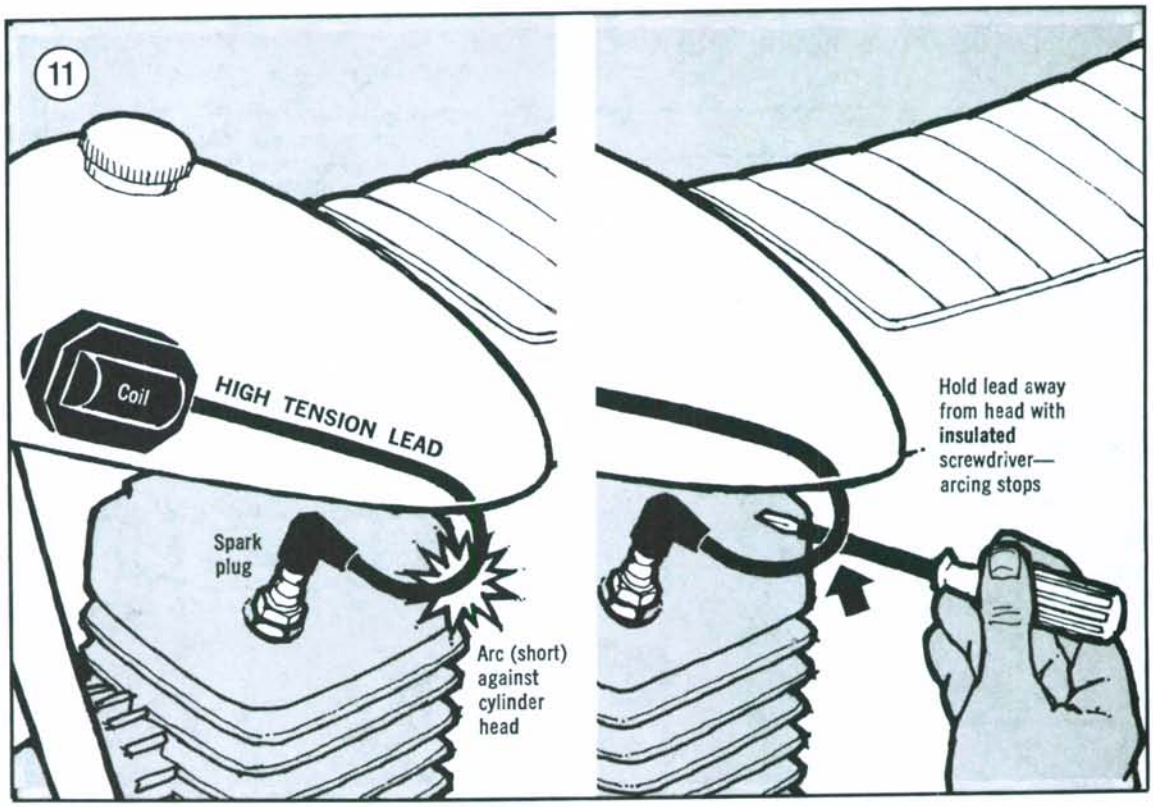
ENGINE MISSES AT HIGH SPEED

Check ignition system (above).
Clean carburetor.



Check jetting—main jet is likely too large.





Check the insulation on the high-tension spark plug lead. If it is cracked or deteriorated it will allow the spark to short to ground when the engine is revved. This is easily seen at night. If arcing occurs, hold the affected area of the wire away from the metal to which it is arcing, using an insulated screwdriver (**Figure 11**), and see if the misfiring ceases. If it does, replace the high-tension lead. Also check the connection of the spark plug cap to the lead. If it is poor, the spark will break down at this point when the engine speed is increased.

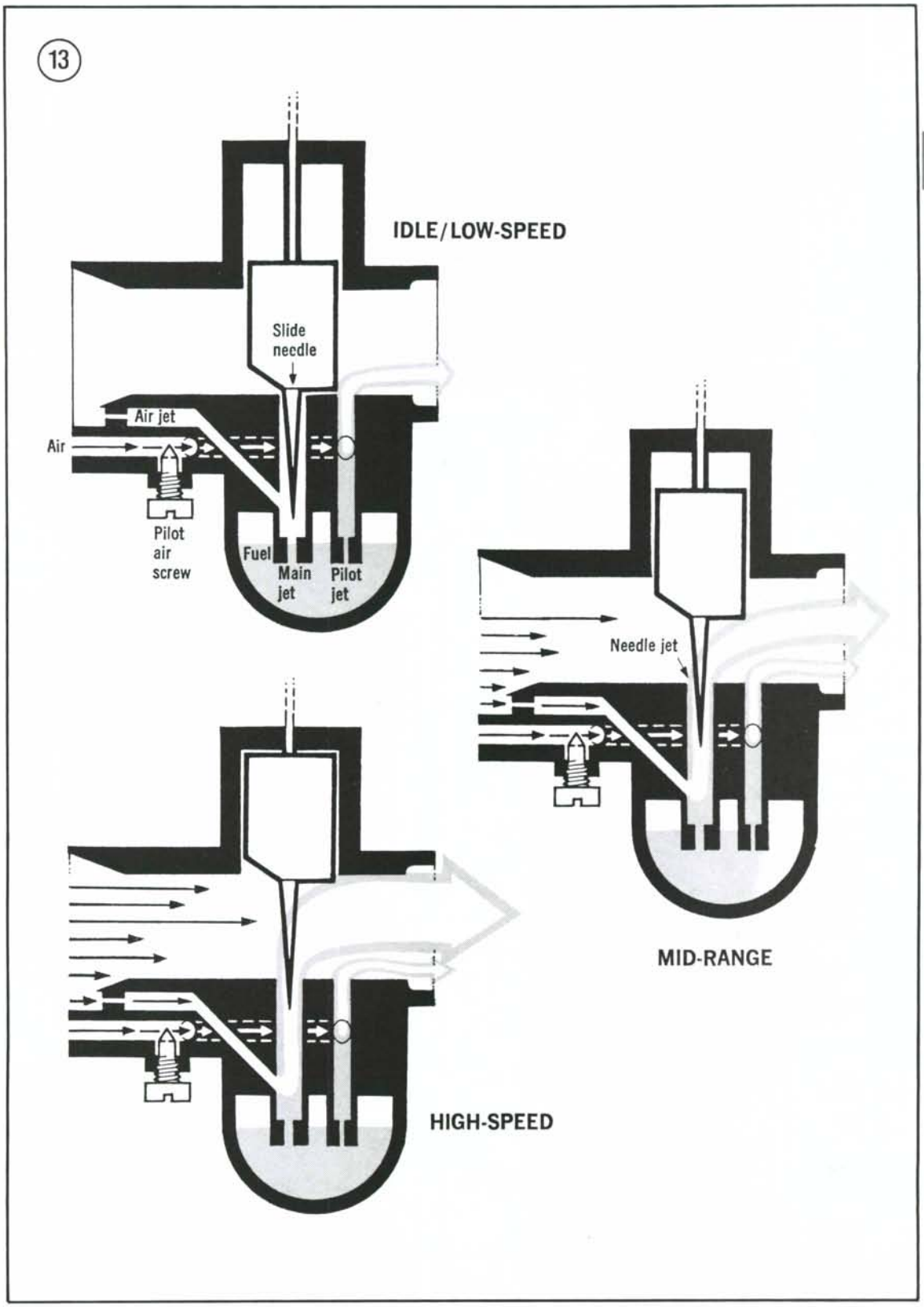
The spark plug could also be poor. Test the system with a new plug.

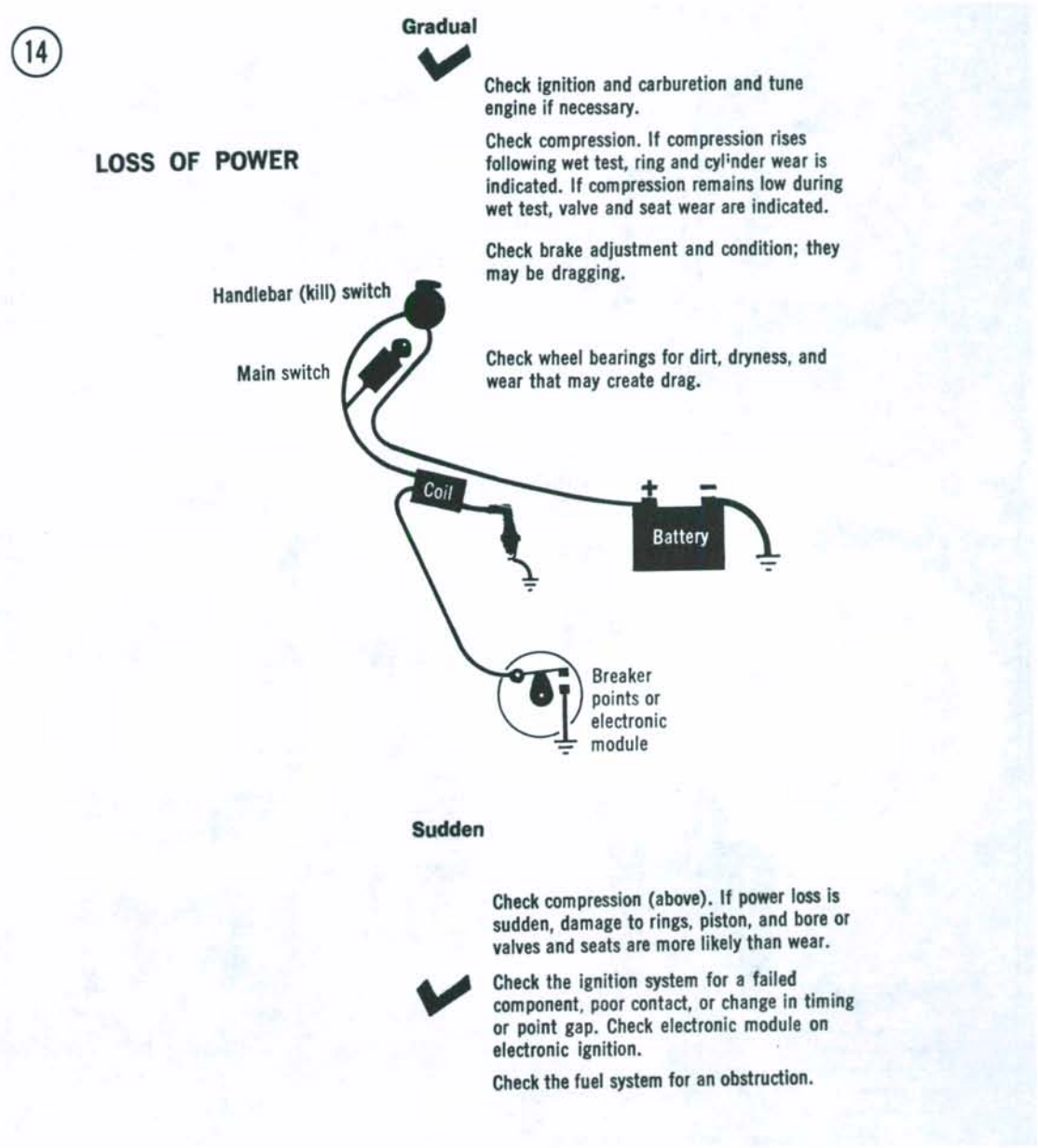
Incorrect point gap or a weak contact breaker spring can cause misfiring. Check the gap and the alignment of the points. Push the moveable arm back and check for spring tension (**Figure 12**). It should feel stiff.



On models with electronic ignition, have the electronic module tested by a dealer or substitute a known good unit for a suspected one.

If misfiring occurs only at a certain point in engine speed, the problem may very likely be

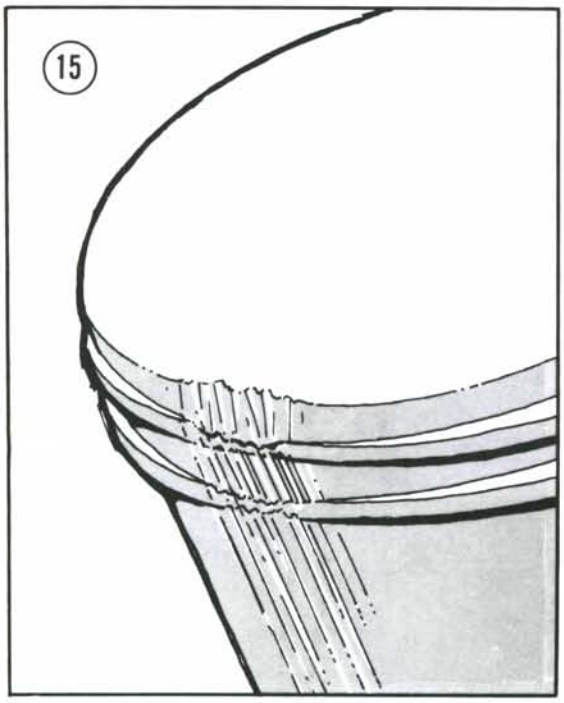

13
IDLE/LOW-SPEED
Slide needle
Air jet
Air
Pilot air screw
Fuel
Main jet
Pilot jet
Needle jet
MID-RANGE
HIGH-SPEED



carburetion. Poor performance at idle is described earlier. Misfiring at low speed (just above idle) can be caused by a dirty low-speed circuit or jet (**Figure 13**). Poor midrange performance is attributable to a worn or incorrectly adjusted needle and needle jet. Misfiring at high speed (if not ignition related) is usually caused by a too-large main jet which causes the engine to run rich. Any of these carburetor-related conditions can be corrected by first cleaning the carburetor and then adjusting it as described in the tune-up and maintenance chapter.

Loss of Power

First determine how the power loss developed (**Figure 14**). Did it decline over a long period of time or did it drop abruptly? A gradual loss is normal, caused by deterioration of the engine's state of tune and the normal wear of the cylinder and piston rings and the valves and seats. In such case, check the condition of the



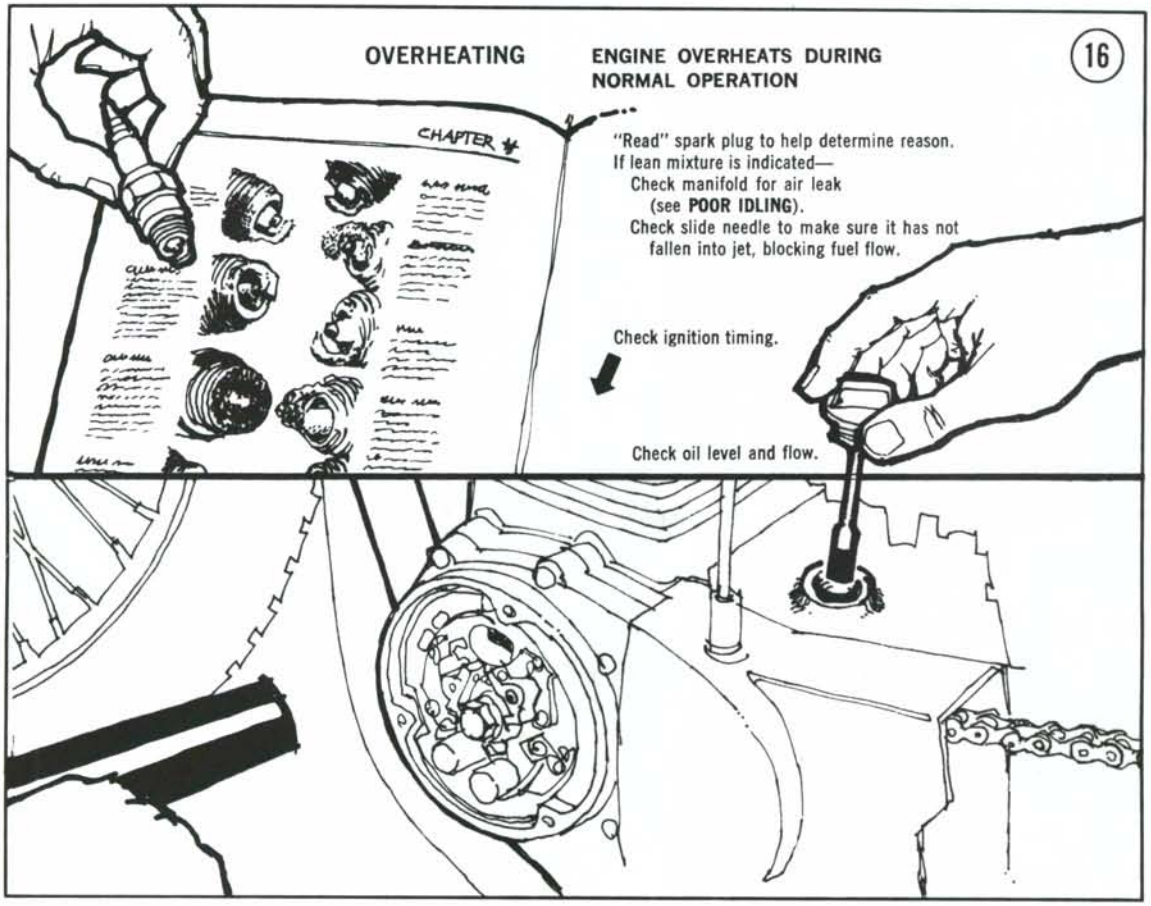
ignition and carburetion and measure the compression as described earlier.

A sudden power loss may be caused by a failed ignition component, obstruction in the fuel system, damaged valve or seat, or a broken piston ring or damaged piston (**Figure 15**).

If the engine is in good shape and tune, check the brake adjustment. If the brakes are dragging, they will consume considerable power. Also check the wheel bearings. If they are dry, extremely dirty, or badly worn they can create considerable drag.

Engine Runs Hot

A modern motorcycle engine, in good mechanical condition, correctly tuned, and operated as it was intended, will rarely experience overheating problems. However, out-of-spec conditions can create severe overheating that may result in serious engine damage. Refer to **Figure 16**.



Overheating is difficult to detect unless it is extreme, in which case it will usually be apparent as excessive heat radiating from the engine, accompanied by the smell of hot oil and sharp, snapping noises when the engine is first shut off and begins to cool.

Unless the motorcycle is operated under sustained high load or is allowed to idle for long periods of time, overheating is usually the result of an internal problem. Most often it's caused by a too-lean fuel mixture.

Remove the spark plug and compare it to **Figure 3**. If a too-lean condition is indicated, check for leaks in the intake manifold (see *Poor Idling*). The carburetor jetting may be incorrect but this is unlikely if the overheating problem has just developed (unless, of course, the engine was jetted for high altitude and is now being run near sea level). Check the slide needle in the carburetor to make sure it hasn't come loose and is restricting the flow of gas through the main jet and needle jet (**Figure 17**).

Check the ignition timing; extremes of either advance or retard can cause overheating.

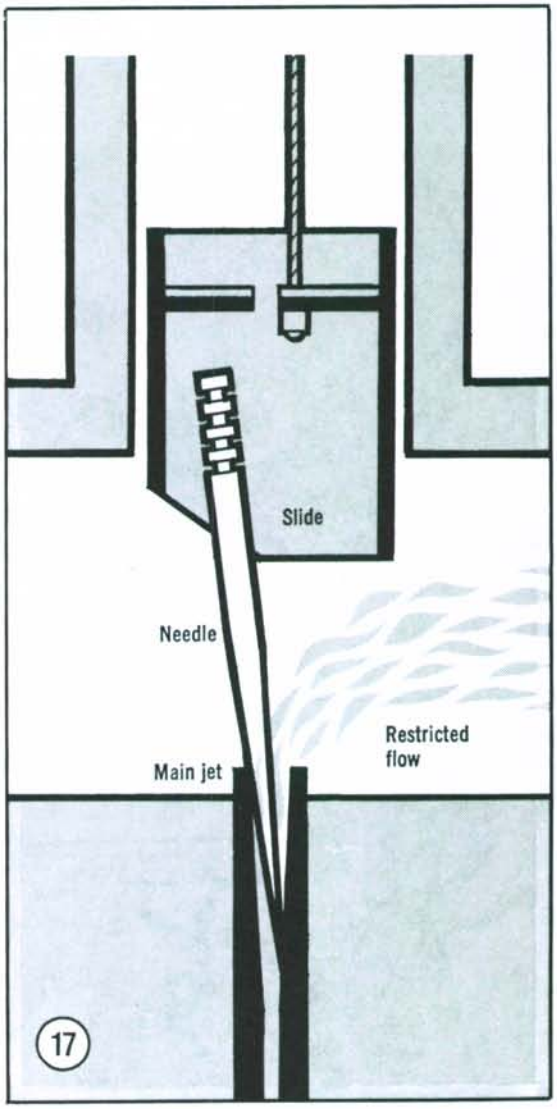
Piston Seizure and Damage

Piston seizure is a common result of overheating (see above) because an aluminum piston expands at a greater rate than a steel cylinder. Seizure can also be caused by piston-to-cylinder clearance that is too small; ring end gap that is too small; insufficient oil; spark plug heat range too hot; and broken piston ring or ring land.

A major piston seizure can cause severe engine damage. A minor seizure — which usually subsides after the engine has cooled a few minutes — rarely does more than scuff the piston skirt the first time it occurs. Fortunately, this condition can be corrected by dressing the piston with crocus cloth, refitting the piston and rings to the bore with recommended clearances, and checking the timing to ensure overheating does not occur. Regard that first seizure as a warning and correct the problem before continuing to run the engine.

CLUTCH AND TRANSMISSION

1. ***Clutch slips***—Make sure lever free play is sufficient to allow the clutch to fully engage

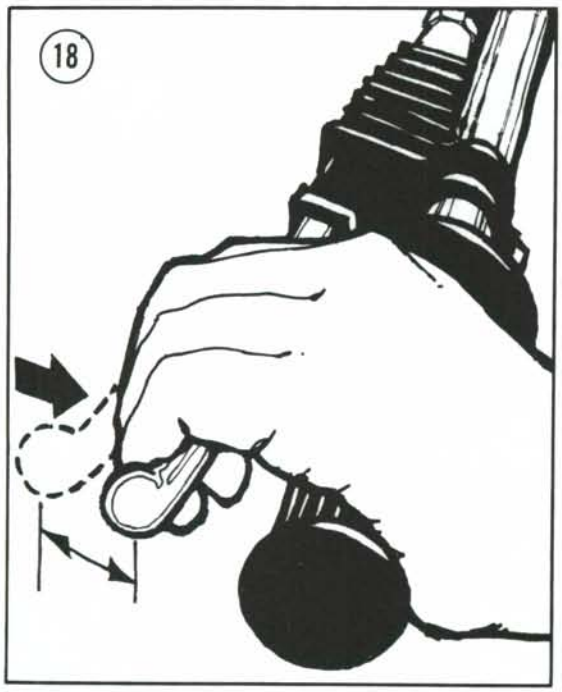


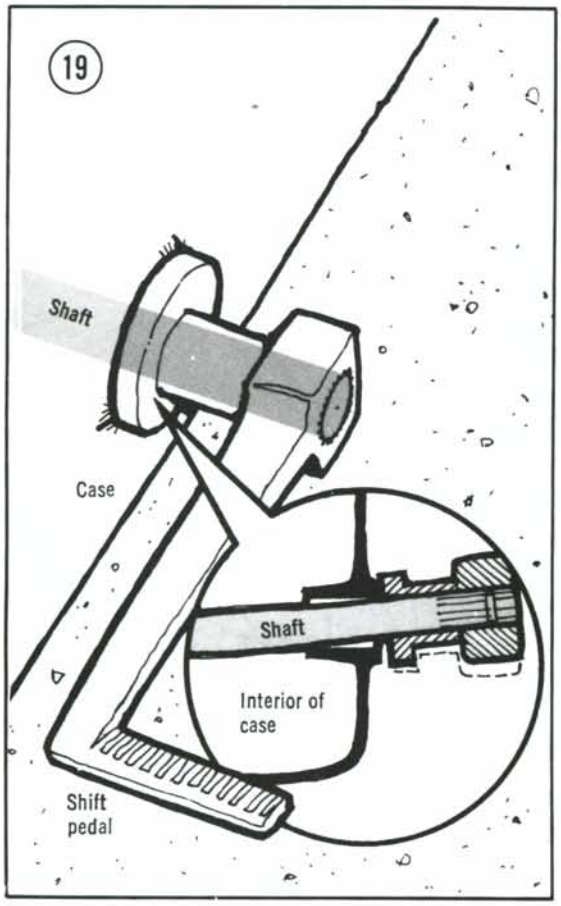
(**Figure 18**). Check the contact surfaces for wear and glazing. Transmission oil additives also can cause slippage in wet clutches. If slip occurs only under extreme load, check the condition of the springs or diaphragm and make sure the clutch bolts are snug and uniformly tightened.

2. ***Clutch drags***—Make sure lever free play isn't so great that it fails to disengage the clutch. Check for warped plates or disc. If the transmission oil (in wet clutch systems) is extremely dirty or heavy, it may inhibit the clutch from releasing.

3. ***Transmission shifts hard***—Extremely dirty oil can cause the transmission to shift hard.

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Check the selector shaft for bending (**Figure 19**). Inspect the shifter and gearsets for wear and damage.

4. ***Transmission slips out of gear***—This can be caused by worn engagement dogs or a worn or damaged shifter (**Figure 20**). The overshift travel on the selector may be misadjusted.

5. ***Transmission is noisy***—Noises usually indicate the absence of lubrication or wear and damage to gears, bearings, or shims. It's a good idea to disassemble the transmission and carefully inspect it when noise first occurs.

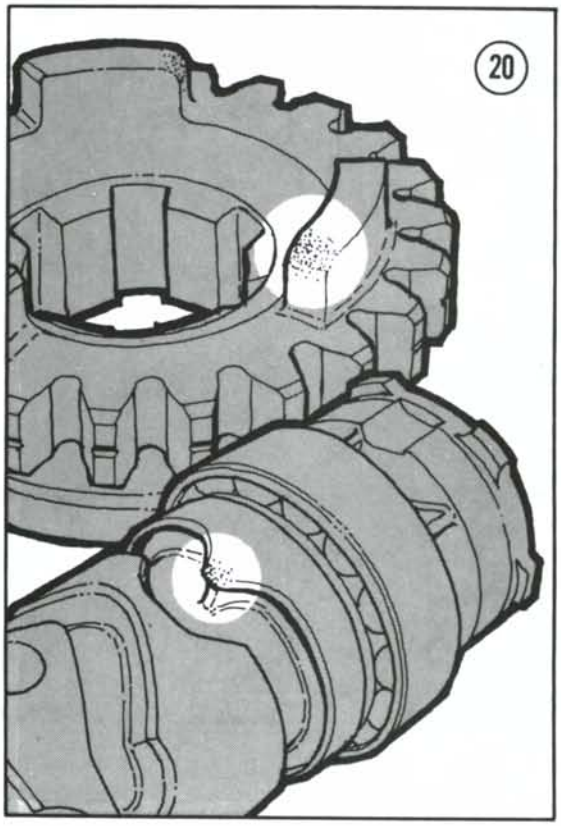
DRIVE TRAIN

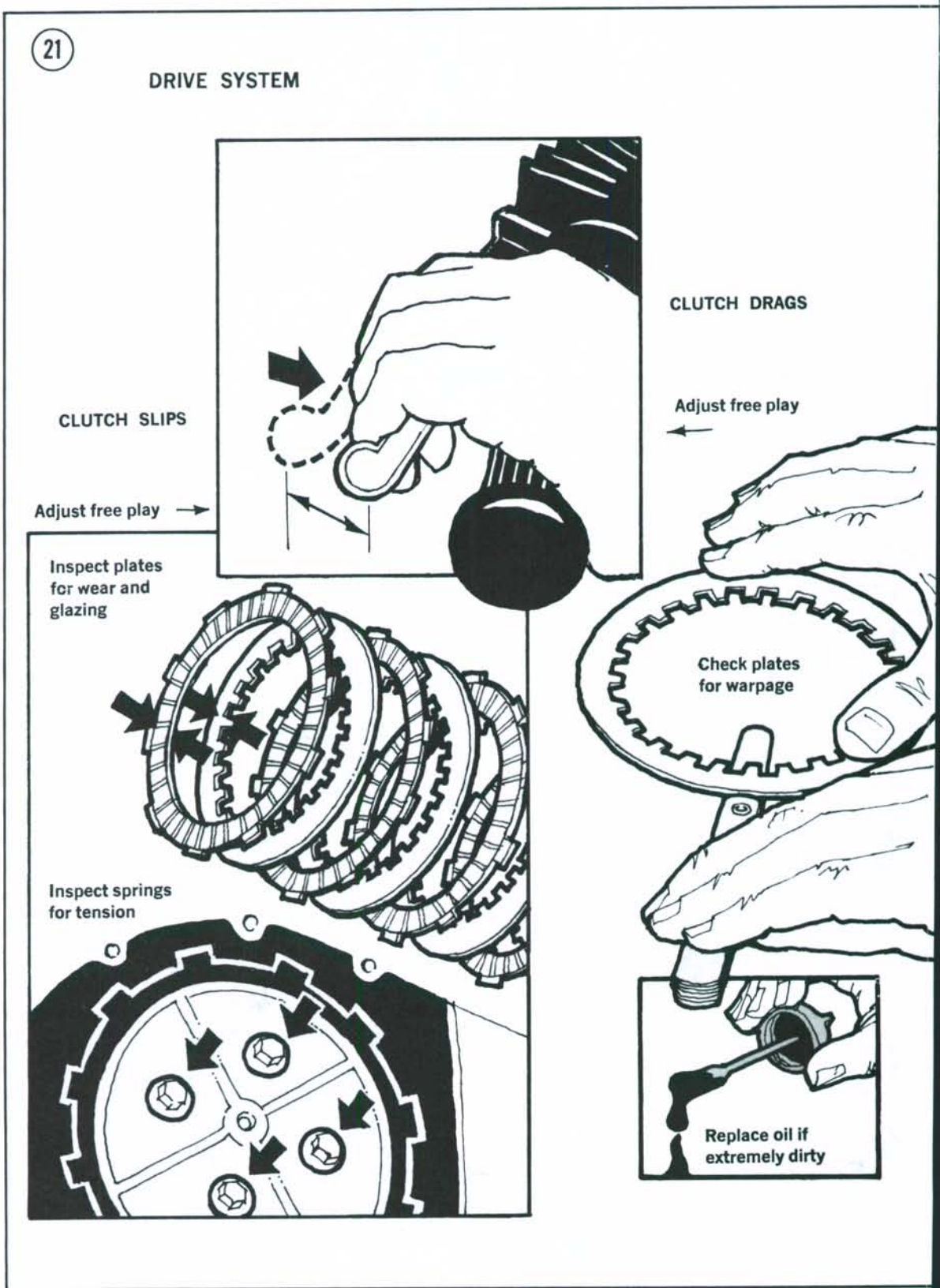
Drive train problems (outlined in **Figure 21**) arise from normal wear and incorrect maintenance.

CHASSIS

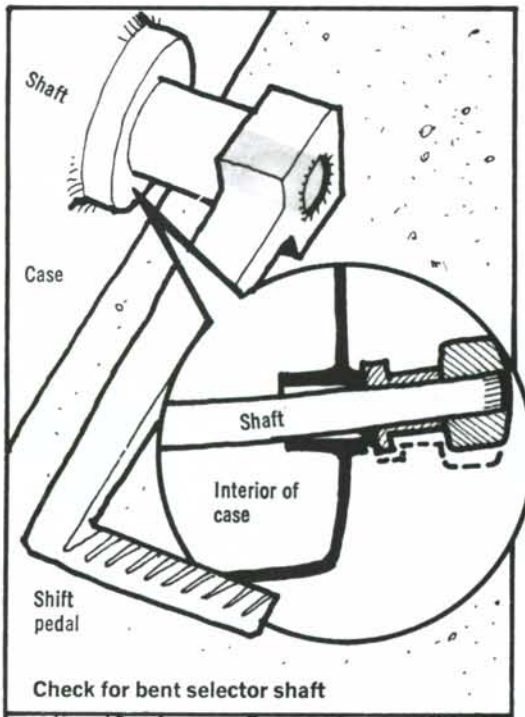
Chassis problems are outlined in **Figure 22**.

1. ***Motorcycle pulls to one side***—Check for loose suspension components, axles, steering

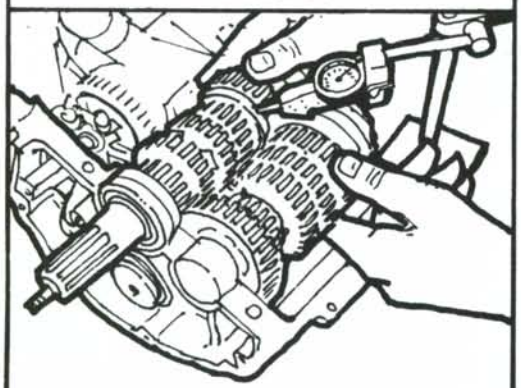



21
DRIVE SYSTEM
CLUTCH DRAGS
Adjust free play
CLUTCH SLIPS
Adjust free play
Inspect plates for wear and glazing
Check plates for warpage
Inspect springs for tension
Replace oil if extremely dirty

TRANSMISSION SHIFTS HARD

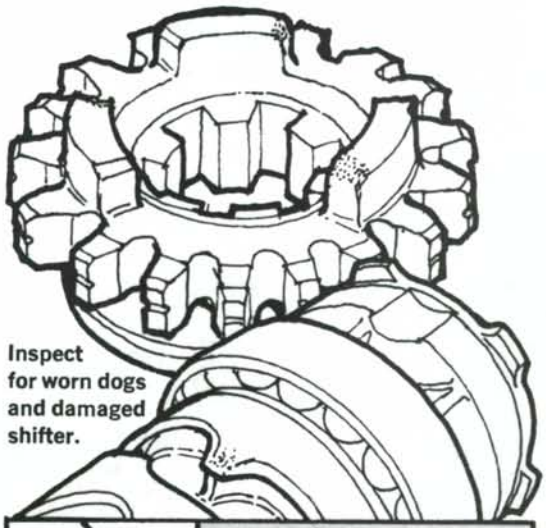


Check for bent selector shaft

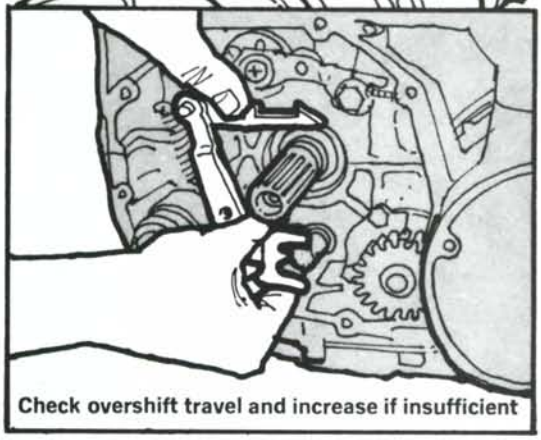


Inspect selector and gearsets for wear

TRANSMISSION SLIPS OUT OF GEAR



Inspect for worn dogs and damaged shifter.

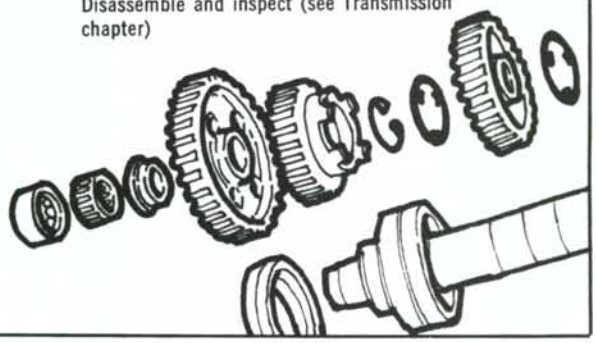


Check overshift travel and increase if insufficient

TRANSMISSION IS NOISY

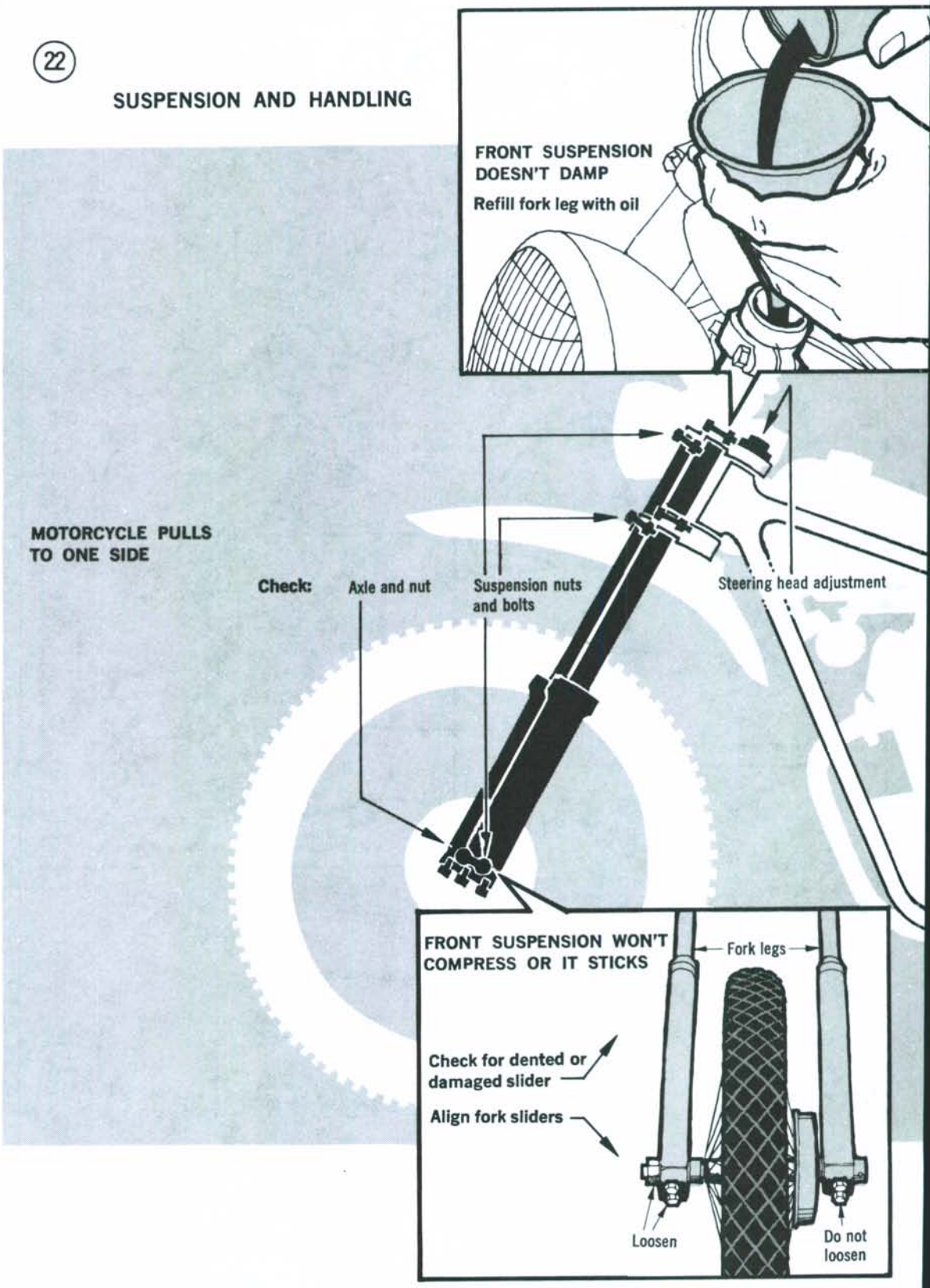
Check oil level

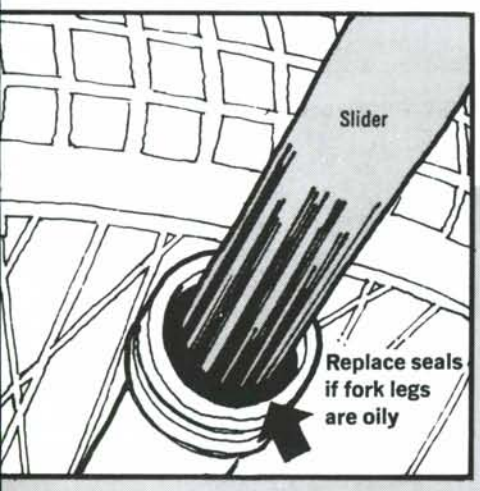
Disassemble and inspect (see Transmission chapter)



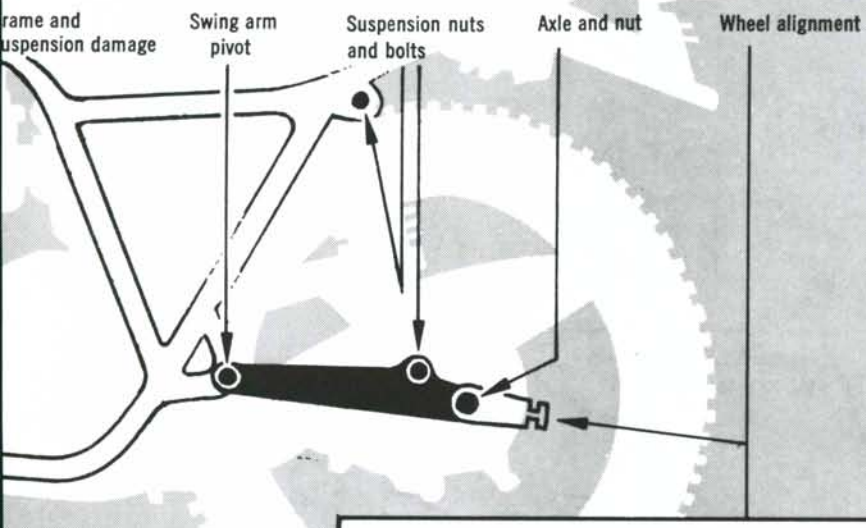
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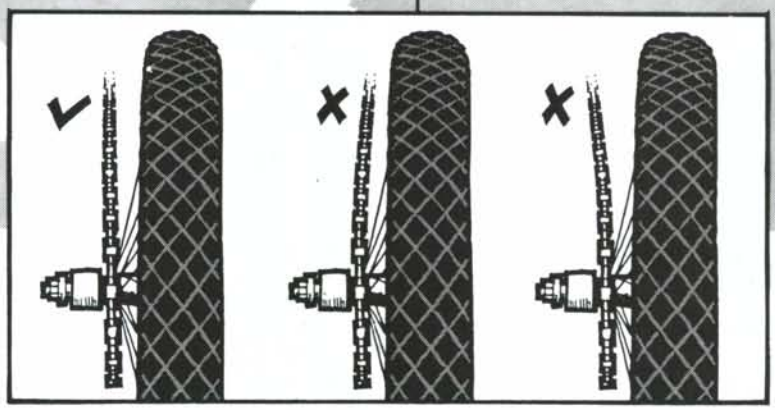
SUSPENSION AND HANDLING



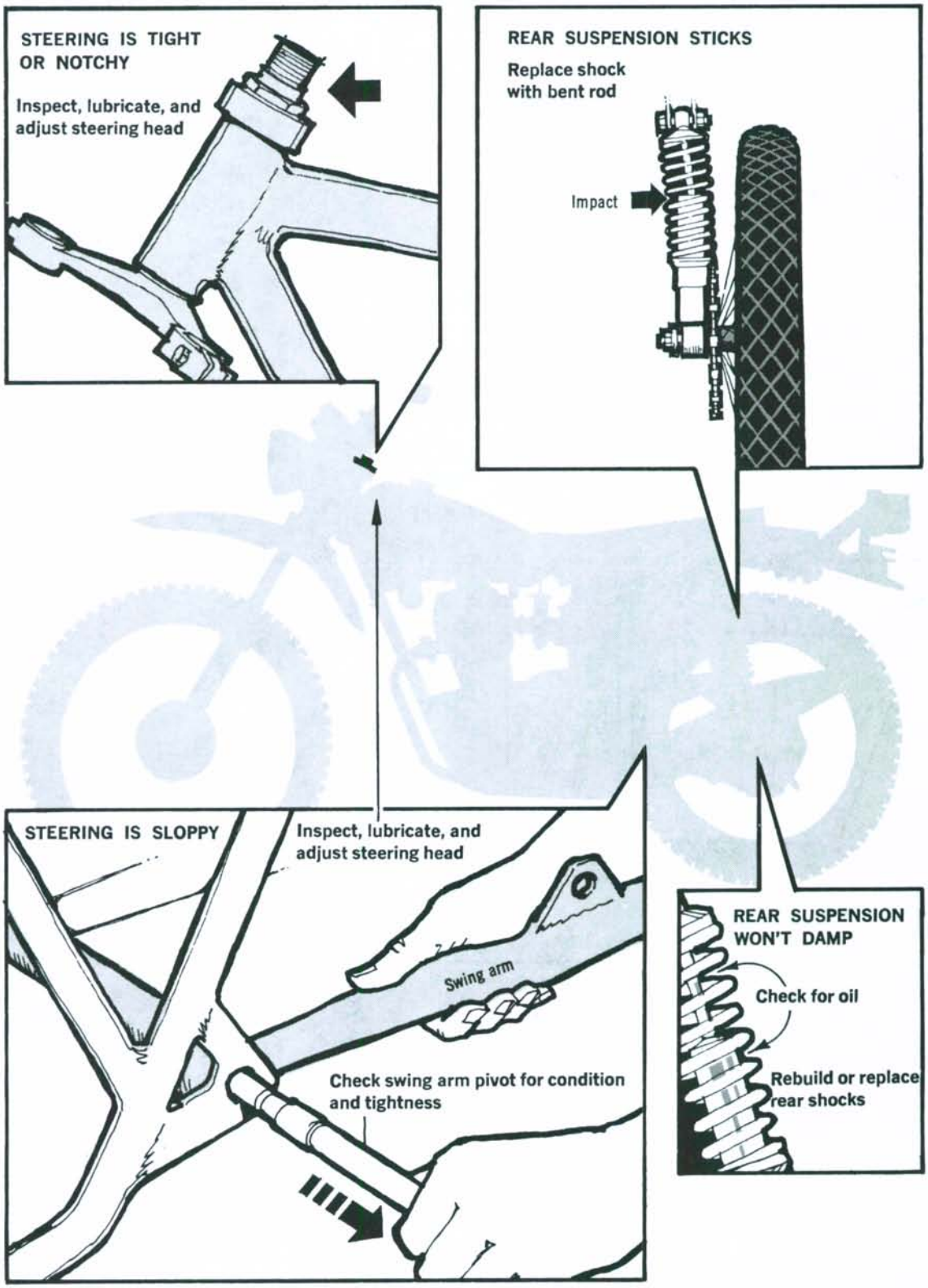


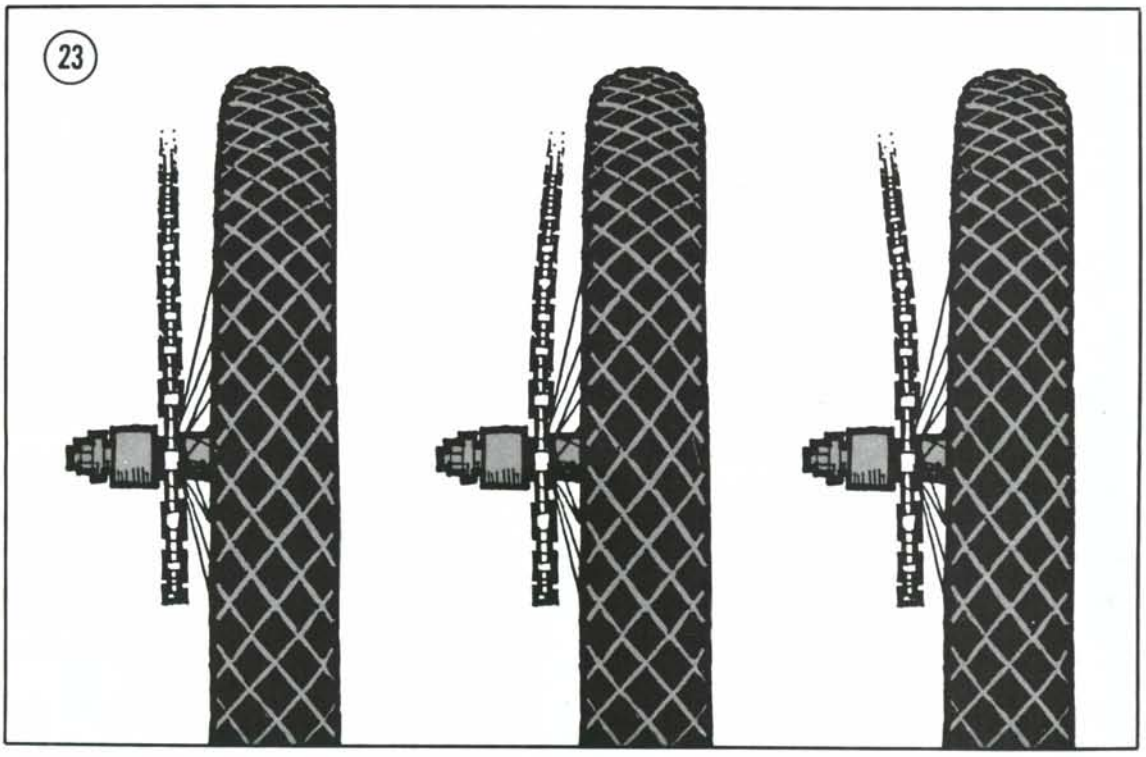
SUSPENSION AND HANDLING CONTINUED





SUSPENSION AND HANDLING CONTINUED





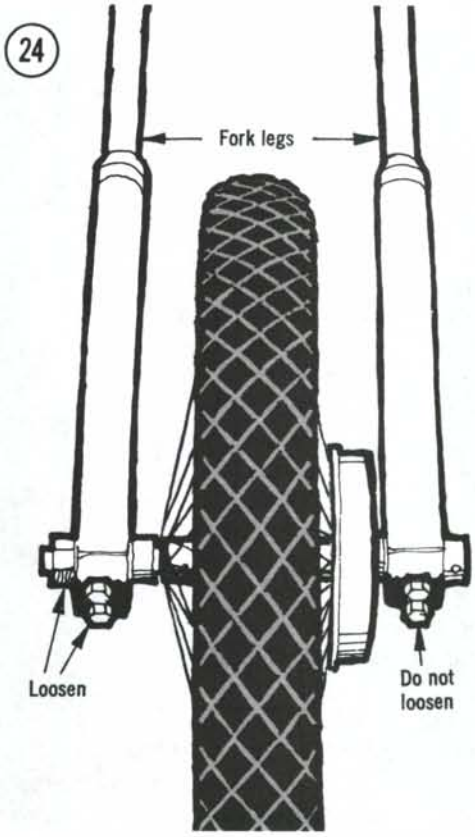
head, swing arm pivot. Check wheel alignment (**Figure 23**). Check for damage to the frame and suspension components.

2. ***Front suspension doesn't damp***—This is most often caused by a lack of damping oil in the fork legs. If the upper fork tubes are exceptionally oily, it's likely that the seals are worn out and should be replaced.

3. ***Front suspension sticks or won't fully compress***—Misalignment of the forks when the wheel is installed can cause this. Loosen the axle nut and the pinch bolt on the nut end of the axle (**Figure 24**). Lock the front wheel with the brake and compress the front suspension several times to align the fork legs. Then, tighten the pinch bolt and then the axle nut.

The trouble may also be caused by a bent or dented fork slider (**Figure 25**). The distortion required to lock up a fork tube is so slight that it is often impossible to visually detect. If this type of damage is suspected, remove the fork leg and remove the spring from it. Attempt to operate the fork leg. If it still binds, replace the slider; it's not practical to repair it.

4. ***Rear suspension does not damp***—This is usually caused by damping oil leaking past



worn seals. Rebuildable shocks should be refitted with complete service kits and fresh oil. Non-rebuildable units should be replaced.

5. ***Rear suspension sticks***—This is commonly caused by a bent shock absorber piston rod (**Figure 26**). Replace the shock; the rod can't be satisfactorily straightened.

6. ***Steering is tight or "notchy"***—Steering head bearings may be dry, dirty, or worn. Adjustment of the steering head bearing pre-load may be too tight.

7. ***Steering is sloppy***—Steering head adjustment may be too loose. Also check the swing arm pivot; looseness or extreme wear at this point translate to the steering.

BRAKES

Brake problems arise from wear, lack of maintenance, and from sustained or repeated exposure to dirt and water.

1. ***Brakes are ineffective***—Ineffective brakes are most likely caused by incorrect adjustment. If adjustment will not correct the problem, remove the wheels and check for worn or glazed linings. If the linings are worn beyond the service limit, replace them. If they are simply glazed, rough them up with light sandpaper.

In hydraulic brake systems, low fluid levels can cause a loss of braking effectiveness, as can worn brake cylinder pistons and bores. Also check the pads to see if they are worn beyond the service limit.

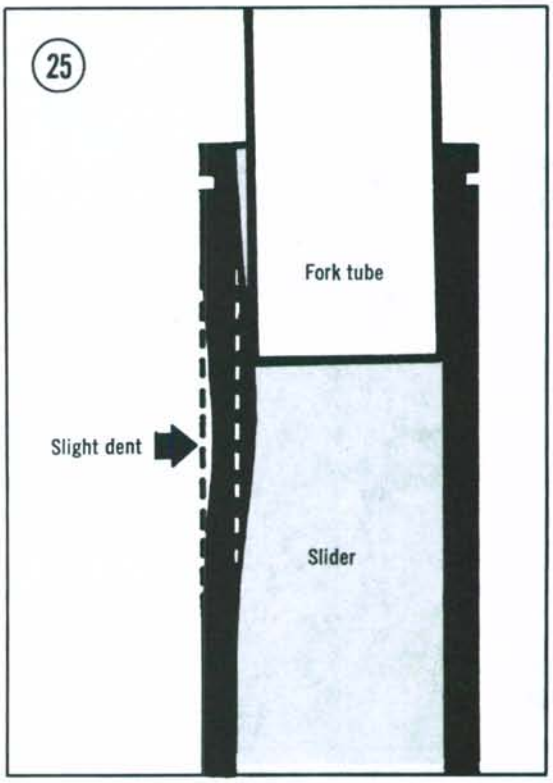
2. ***Brakes lock or drag***—This may be caused by incorrect adjustment. Check also for foreign matter embedded in the lining and for dirty and dry wheel bearings.

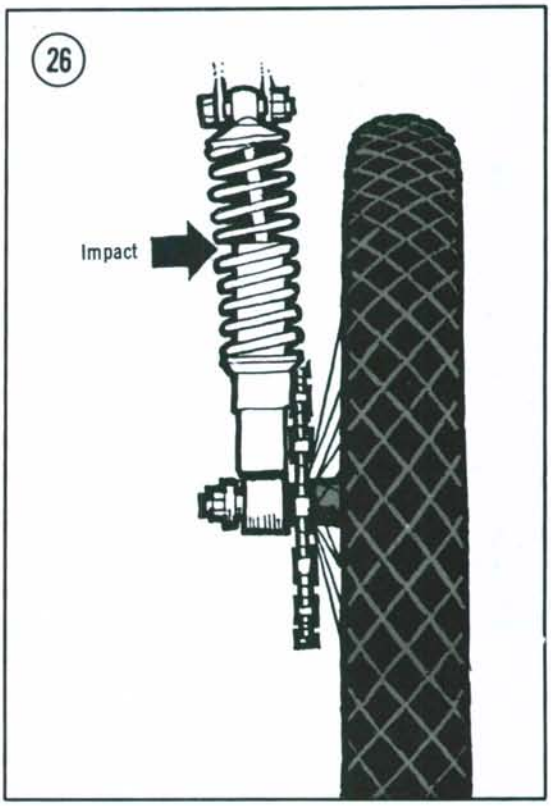
ELECTRICAL SYSTEM

Many electrical system problems can be easily solved by ensuring that the affected connections are clean, dry, and tight. In battery equipped motorcycles, a neglected battery is the source of a great number of difficulties that could be prevented by simple, regular service to the battery.

A multimeter, like the volt/ohm/milliammeter described in Chapter One, is invaluable for efficient electrical system troubleshooting.

See **Figures 27 and 28** for schematics showing





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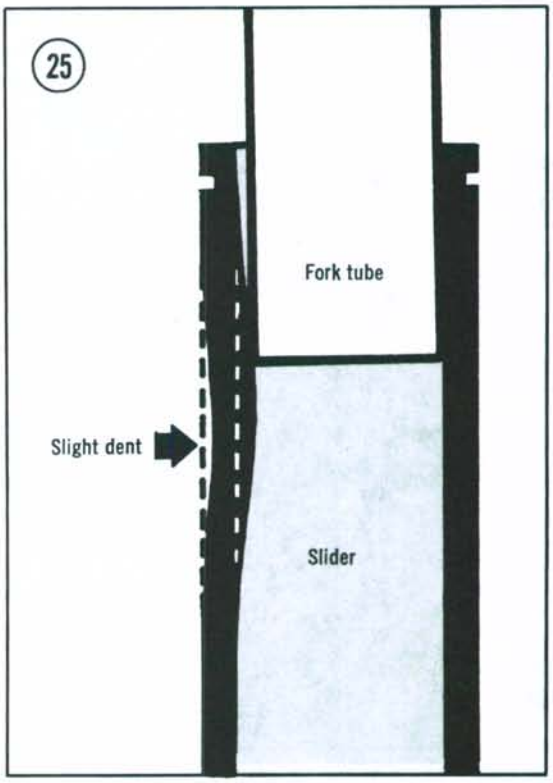
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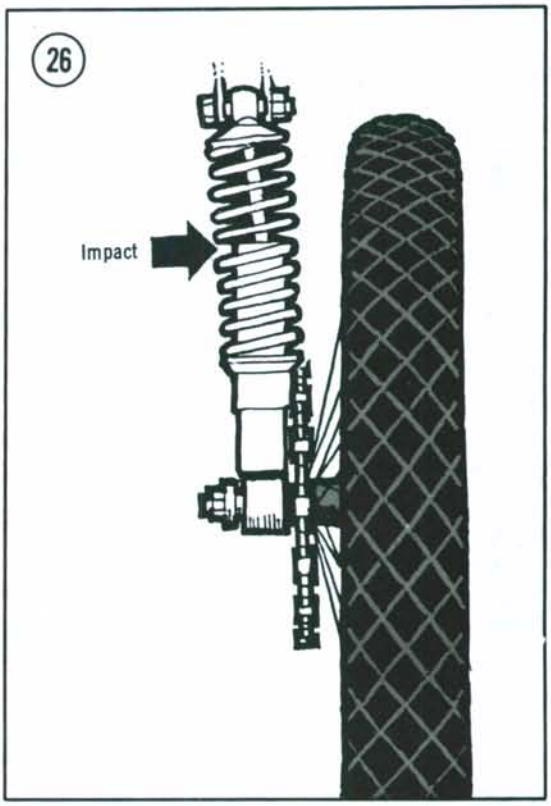
ELECTRICAL SYSTEM

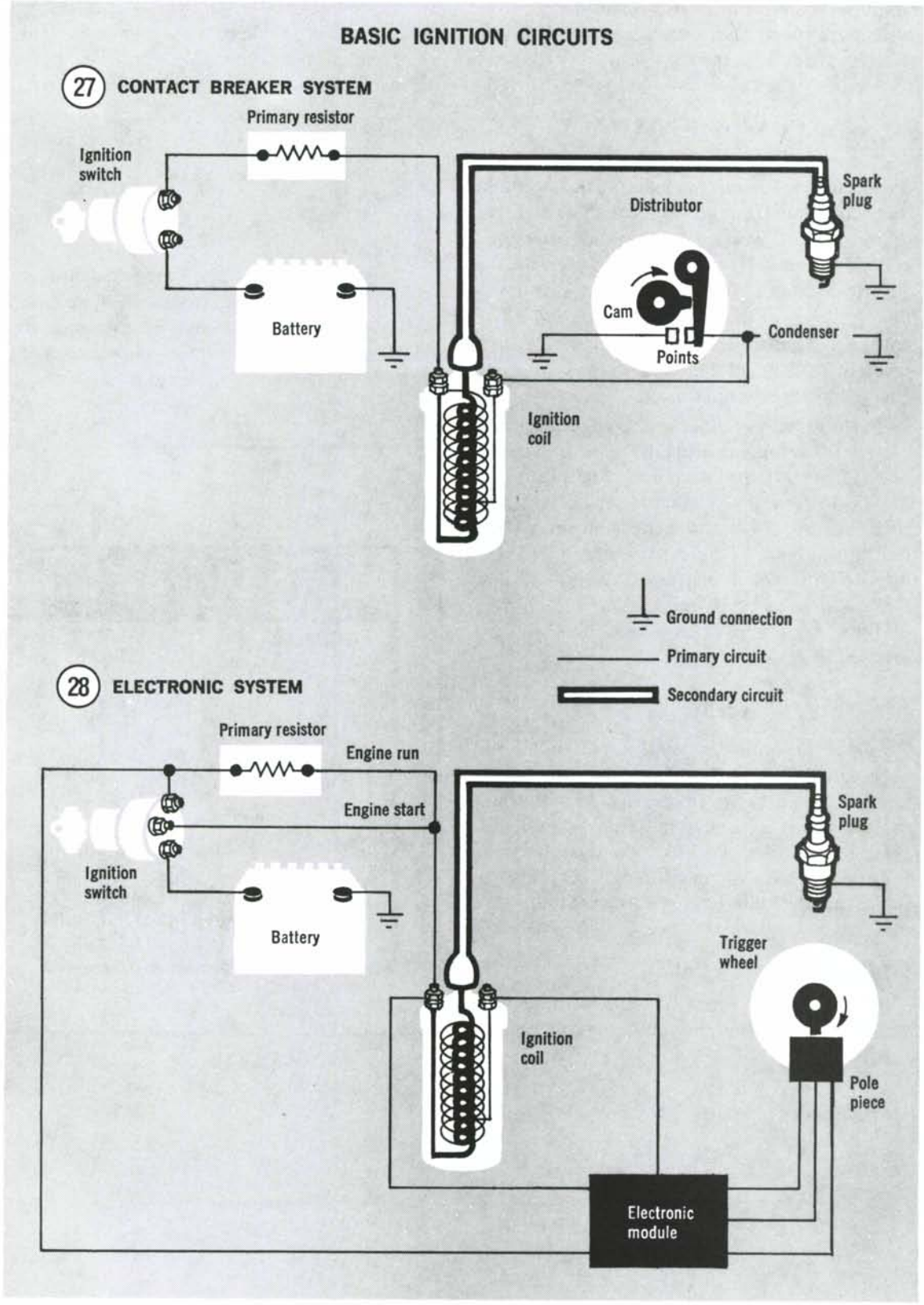
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See **Figures 27 and 28** for schematics showing






BASIC IGNITION CIRCUITS
27 CONTACT BREAKER SYSTEM
Primary resistor
Ignition switch
Battery
Distributor
Spark plug
Cam
Points
Condenser
Ignition coil
Ground connection
Primary circuit
Secondary circuit
28 ELECTRONIC SYSTEM
Primary resistor
Engine run
Engine start
Ignition switch
Battery
Spark plug
Trigger wheel
Ignition coil
Pole piece
Electronic module

simplified conventional and electronic ignition systems. Typical and most common electrical troubles are also described.

CHARGING SYSTEM

1. ***Battery will not accept a charge***—Make sure the electrolyte level in the battery is correct and that the terminal connections are tight and free of corrosion. Check for fuses in the battery circuit. If the battery is satisfactory, refer to the electrical system chapter for alternator tests. Finally, keep in mind that even a good alternator is not capable of restoring the charge to a severely discharged battery; it must first be charged by an external source.

2. ***Battery will not hold a charge***—Check the battery for sulfate deposits in the bottom of the case (**Figure 29**). Sulfation occurs naturally and the deposits will accumulate and eventually come in contact with the plates and short them out. Sulfation can be greatly retarded by keeping the battery well charged at all times. Test the battery to assess its condition.

If the battery is satisfactory, look for excessive draw, such as a short.

LIGHTING

Bulbs burn out frequently—All bulbs will eventually burn out, but if the bulb in one particular light burns out frequently check the light assembly for looseness that may permit excessive vibration; check for loose connections that could cause current surges; check also to make sure the bulb is of the correct rating.

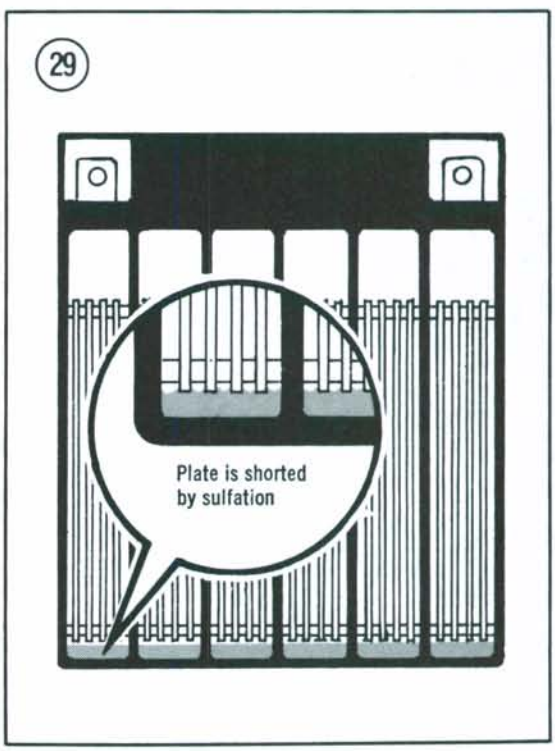
FUSES

Fuse blows—When a fuse blows, don't just replace it; try to find the cause. Consider a fuse a warning device as well as a safety device. And never replace a fuse with one of greater amperage rating. It probably won't melt before the insulation on the wiring does.

WIRING

Wiring problems should be corrected as soon as they arise — before a short can cause a fire that may seriously damage or destroy the motorcycle.

A circuit tester of some type is essential for locating shorts and opens. Use the appropriate wiring diagram at the end of the book for reference. If a wire must be replaced make a notation on the wiring diagram of any changes in color coding.



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CHAPTER TWO

TROUBLESHOOTING

Troubleshooting motorcycle problems is relatively simple. To be effective and efficient, however, it must be done in a logical step-by-step manner. If it is not, a great deal of time may be wasted, good parts may be replaced unnecessarily, and the true problem may never be uncovered.

Always begin by defining the symptoms as closely as possible. Then, analyze the symptoms carefully so that you can make an intelligent guess at the probable cause. Next, test the probable cause and attempt to verify it; if it's not at fault, analyze the symptoms once again, this time eliminating the first probable cause. Continue on in this manner, a step at a time, until the problem is solved.

At first, this approach may seem to be time consuming, but you will soon discover that it's not nearly so wasteful as a hit-or-miss method that may never solve the problem. And just as important, the methodical approach to troubleshooting ensures that only those parts that are defective will be replaced.

The troubleshooting procedures in this chapter analyze typical symptoms and show logical methods for isolating and correcting trouble. They are not, however, the only methods; there may be several approaches to a given problem, but all good troubleshooting methods have one thing in common — a logical, systematic approach.

ENGINE

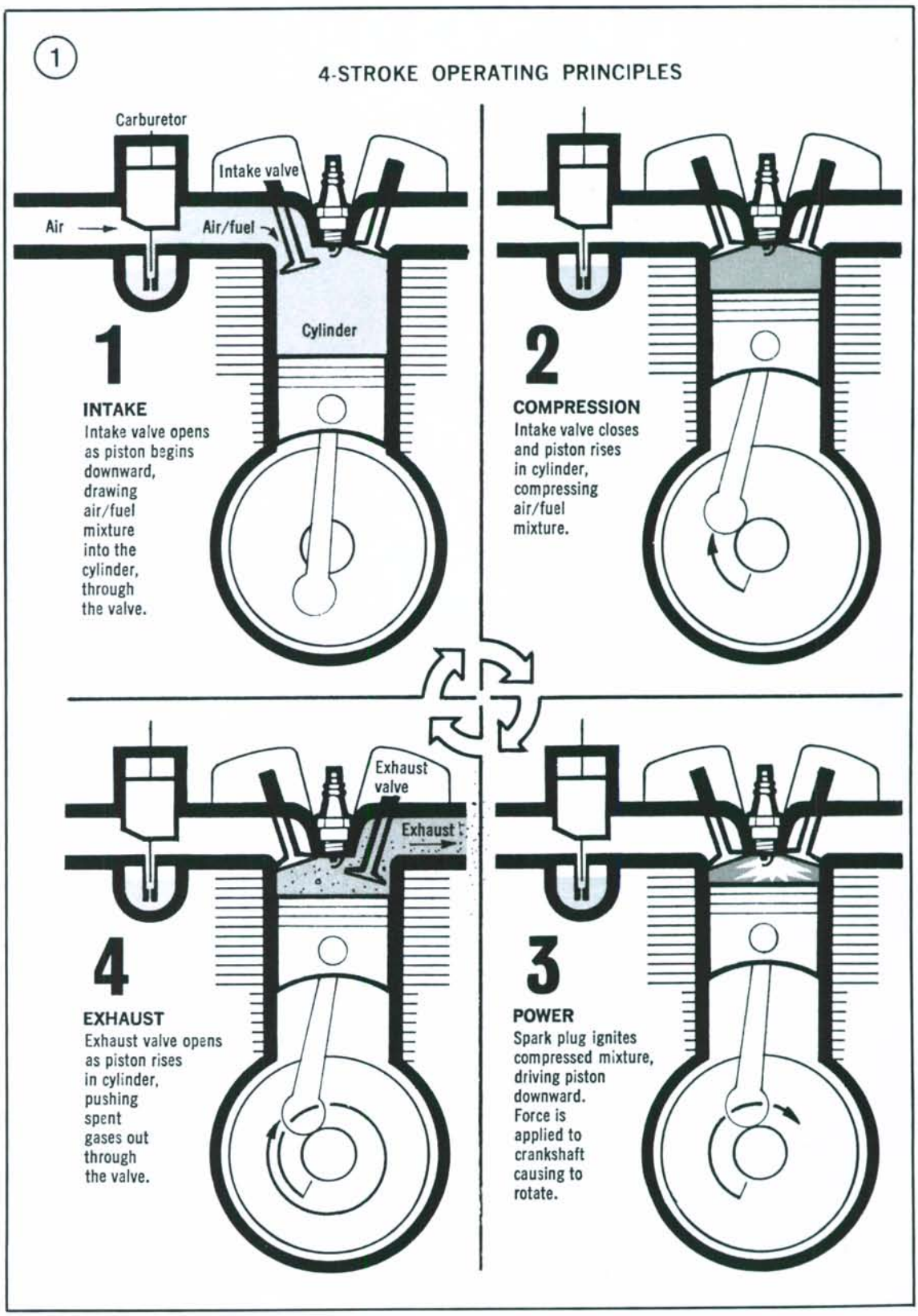
The entire engine must be considered when trouble arises that is experienced as poor performance or failure to start. The engine is more than a combustion chamber, piston, and crankshaft; it also includes a fuel delivery system, an ignition system, and an exhaust system.

Before beginning to troubleshoot any engine problems, it's important to understand an engine's operating requirements. First, it must have a correctly metered mixture of gasoline and air (**Figure 1**). Second, it must have an airtight combustion chamber in which the mixture can be compressed. And finally, it requires a precisely timed spark to ignite the compressed mixture. If one or more is missing, the engine won't run, and if just one is deficient, the engine will run poorly at best.

Of the three requirements, the precisely timed spark — provided by the ignition system — is most likely to be the culprit, with gas/air mixture (carburetion) second, and poor compression the least likely.

STARTING DIFFICULTIES

Hard starting is probably the most common motorcycle ailment, with a wide range of problems likely. Before delving into a reluctant or non-starter, first determine what has changed


1
4-STROKE OPERATING PRINCIPLES
Carburetor
Intake valve
Air
Air/fuel
Cylinder
1
INTAKE
Intake valve opens as piston begins downward, drawing air/fuel mixture into the cylinder, through the valve.
2
COMPRESSION
Intake valve closes and piston rises in cylinder, compressing air/fuel mixture.
Exhaust valve
Exhaust
4
EXHAUST
Exhaust valve opens as piston rises in cylinder, pushing spent gases out through the valve.
3
POWER
Spark plug ignites compressed mixture, driving piston downward. Force is applied to crankshaft causing to rotate.

since the motorcycle last started easily. For instance, was the weather dry then and is it wet now? Has the motorcycle been sitting in the garage for a long time? Has it been ridden many miles since it was last fueled?

Has starting become increasingly more difficult? This alone could indicate a number of things that may be wrong but is usually associated with normal wear of ignition and engine components.

While it's not always possible to diagnose trouble simply from a change of conditions, this information can be helpful and at some future time may uncover a recurring problem.

Fuel Delivery

Although it is the second most likely cause of trouble, fuel delivery should be checked first simply because it is the easiest.

First, check the tank to make sure there is fuel in it. Then, disconnect the fuel hose at the carburetor, open the valve and check for flow (**Figure 2**). If fuel does not flow freely make sure the tank vent is clear. Next, check for blockage in the line or valve. Remove the valve and clean it as described in the fuel system chapter.

If fuel flows from the hose, reconnect it and remove the float bowl from the carburetor, open the valve and check for flow through the float needle valve. If it does not flow freely when the float is extended and then shut off when the flow is gently raised, clean the carburetor as described in the fuel system chapter.

When fuel delivery is satisfactory, go on to the ignition system.

Ignition

Remove the spark plug from the cylinder and check its condition. The appearance of the plug is a good indication of what's happening in the combustion chamber; for instance, if the plug is wet with gas, it's likely that engine is flooded. Compare the spark plug to **Figure 3**. Make certain the spark plug heat range is correct. A "cold" plug makes starting difficult.

After checking the spark plug, reconnect it to the high-tension lead and lay it on the cylinder head so it makes good contact (**Figure 4**). Then, with the ignition switched on, crank the engine several times and watch for a spark across the plug electrodes. A fat, blue spark should be visible. If there is no spark, or if the spark is weak, substitute a good plug for the old one and check again. If the spark has improved, the old plug is faulty. If there was no change, keep looking.

Make sure the ignition switch is not shorted to ground. Remove the spark plug cap from the end of the high-tension lead and hold the exposed end of the lead about ⅛ inch from the cylinder head. Crank the engine and watch for a spark arcing from the lead to the head. If it's satisfactory, the connection between the lead and the cap was faulty. If the spark hasn't improved, check the coil wire connections.

If the spark is still weak, remove the ignition cover and remove any dirt or moisture from the points or sensor. Check the point or air gap against the specifications in the *Quick Reference Data* at the beginning of the book.

If spark is still not satisfactory, a more serious problem exists than can be corrected with simple adjustments. Refer to the electrical system chapter for detailed information for correcting major ignition problems.

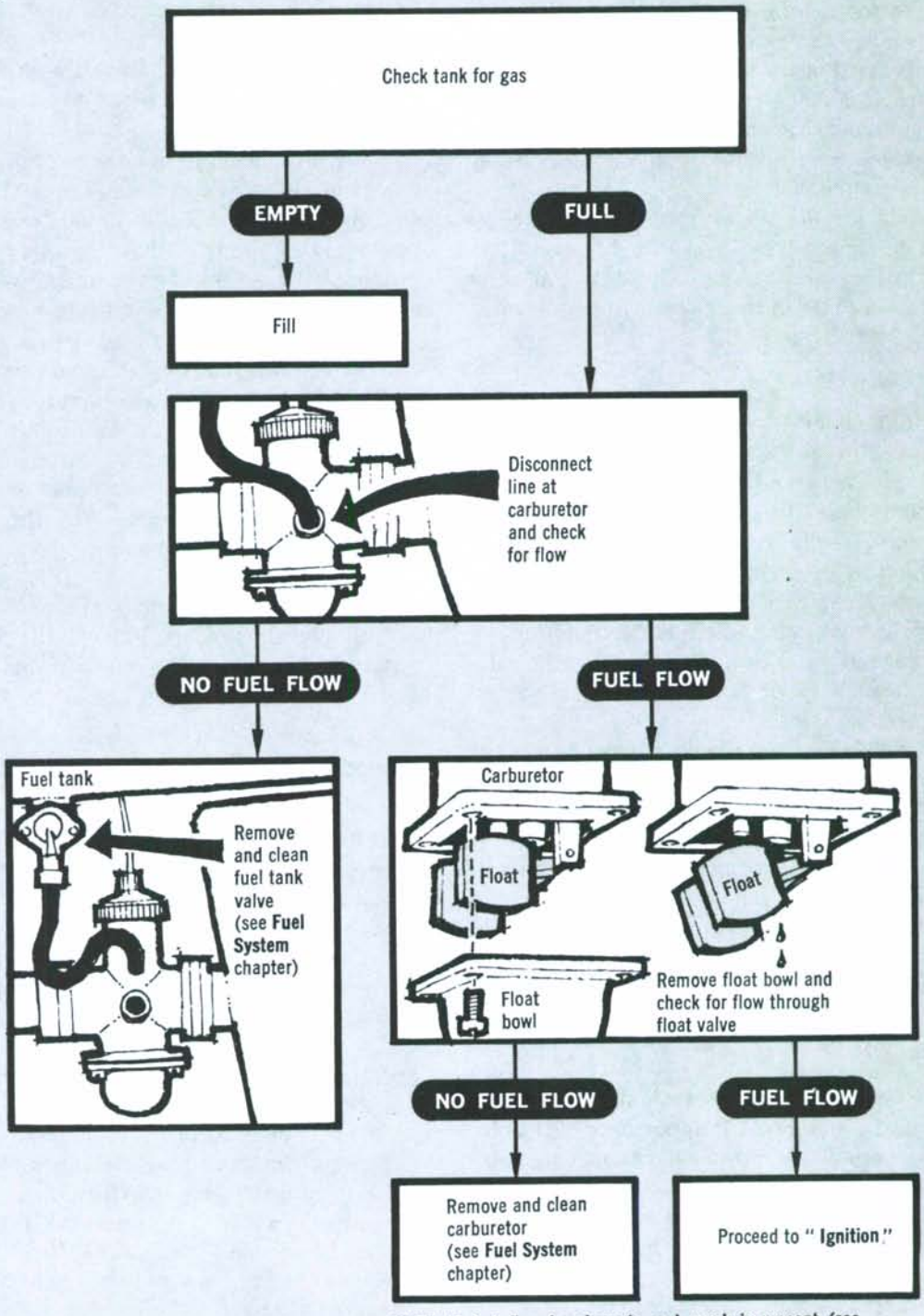
Compression

Compression — or the lack of it — is the least likely cause of starting trouble. However, if compression is unsatisfactory, more than a simple adjustment is required to correct it (see the engine chapter).

An accurate compression check reveals a lot about the condition of the engine. To perform this test you need a compression gauge (see Chapter One). The engine should be at operating temperature for a fully accurate test, but even a cold test will reveal if the starting problem is compression.

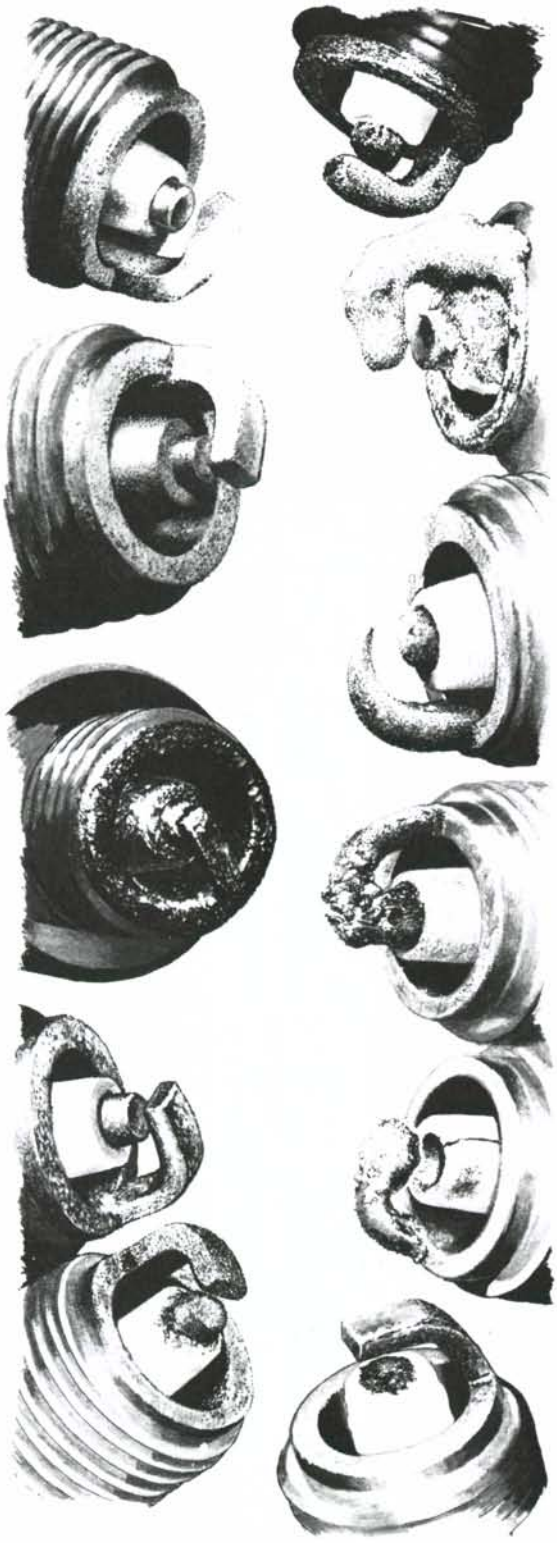
Remove the spark plug and screw in a compression gauge (**Figure 5**). With assistance, hold the throttle wide open and crank the engine several times, until the gauge ceases to rise. Normal compression should be 130-160 psi, but a reading as low as 100 psi is usually sufficient for the engine to start. If the reading is much lower than normal, remove the gauge and pour about a tablespoon of oil into the cylinder.

(2) **FUEL DELIVERY**



NOTE: If fuel flow is adequate and spark is present (see **Ignition** which follows), increase fuel ratio with idle screw.

(3)



NORMAL
- Appearance—Firing tip has deposits of light gray to light tan.
- Can be cleaned, regapped and reused.

CARBON FOULED
- Appearance—Dull, dry black with fluffy carbon deposits on the insulator tip, electrode and exposed shell.
- Caused by—Fuel/air mixture too rich, plug heat range too cold, weak ignition system, dirty air cleaner, faulty automatic choke or excessive idling.
- Can be cleaned, regapped and reused.

OIL FOULED
- Appearance—Wet black deposits on insulator and exposed shell.
- Caused by—Excessive oil entering the combustion chamber through worn rings, pistons, valve guides or bearings.
- Replace with new plugs (use a hotter plug if engine is not repaired).

LEAD FOULED
- Appearance — Yellow insulator deposits (may sometimes be dark gray, black or tan in color) on the insulator tip.
- Caused by—Highly leaded gasoline.
- Replace with new plugs.

LEAD FOULED
- Appearance—Yellow glazed deposits indicating melted lead deposits due to hard acceleration.
- Caused by—Highly leaded gasoline.
- Replace with new plugs.

OIL AND LEAD FOULED
- Appearance—Glazed yellow deposits with a slight brownish tint on the insulator tip and ground electrode.
- Replace with new plugs.

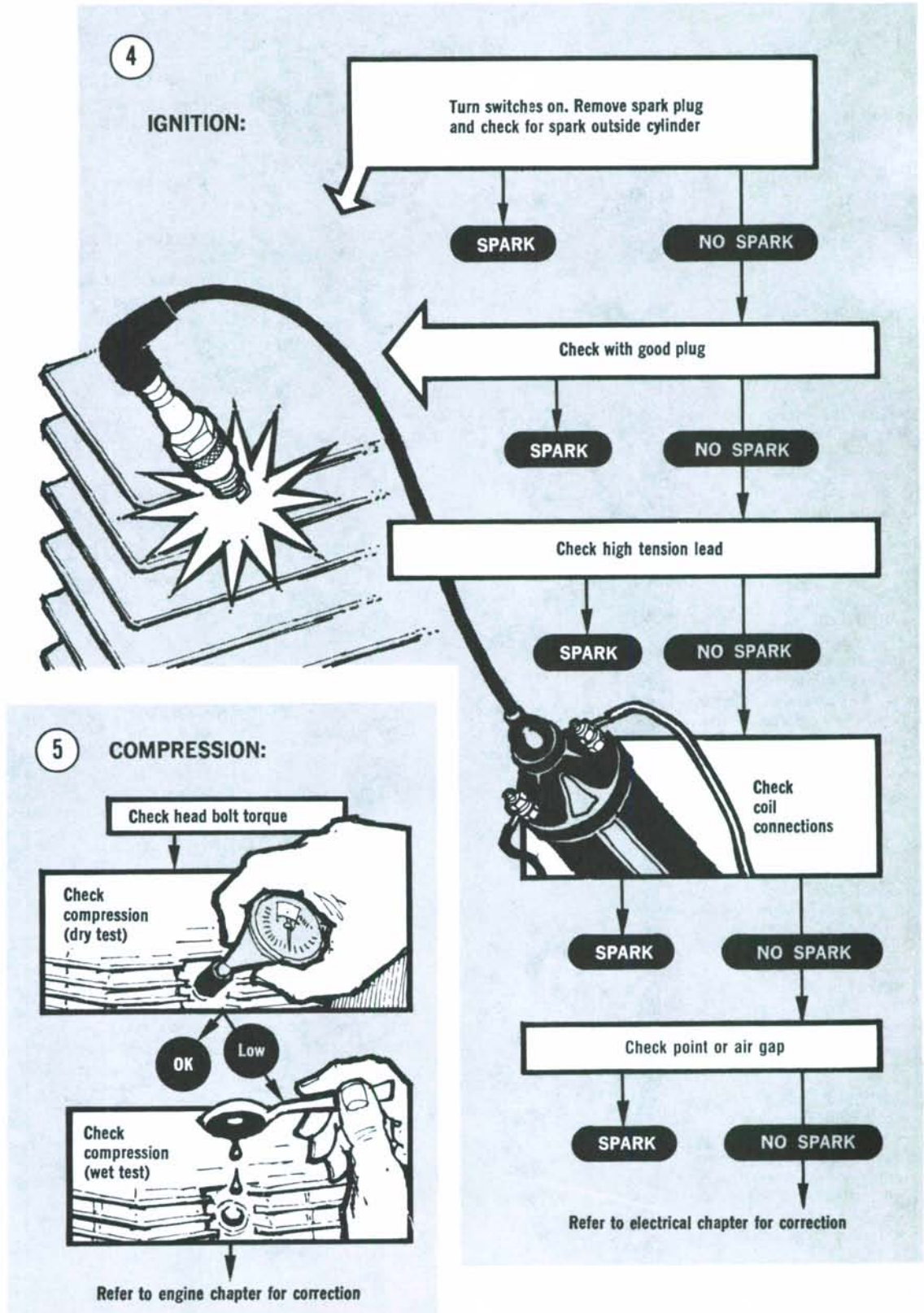
FUEL ADDITIVE RESIDUE
- Appearance — Brown colored hardened ash deposits on the insulator tip and ground electrode.
- Caused by—Fuel and/or oil additives.
- Replace with new plugs.

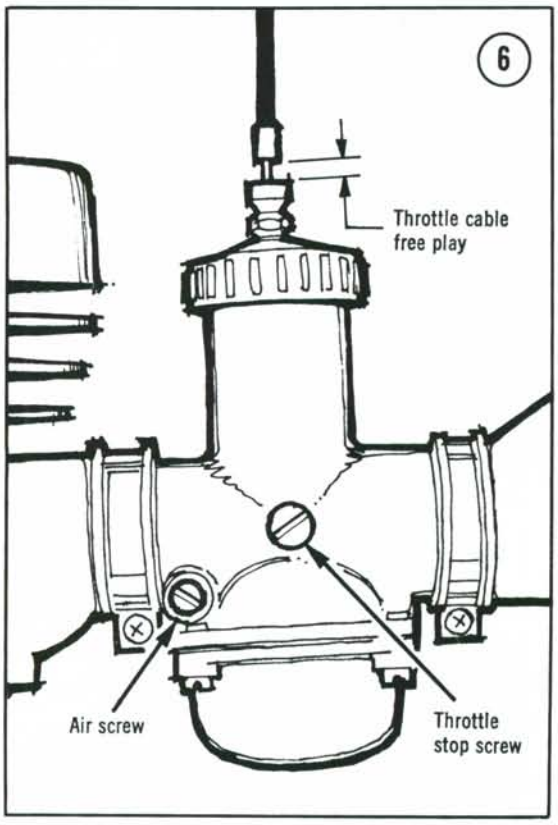
WORN
- Appearance — Severely worn or eroded electrodes.
- Caused by—Normal wear or unusual oil and/or fuel additives.
- Replace with new plugs.

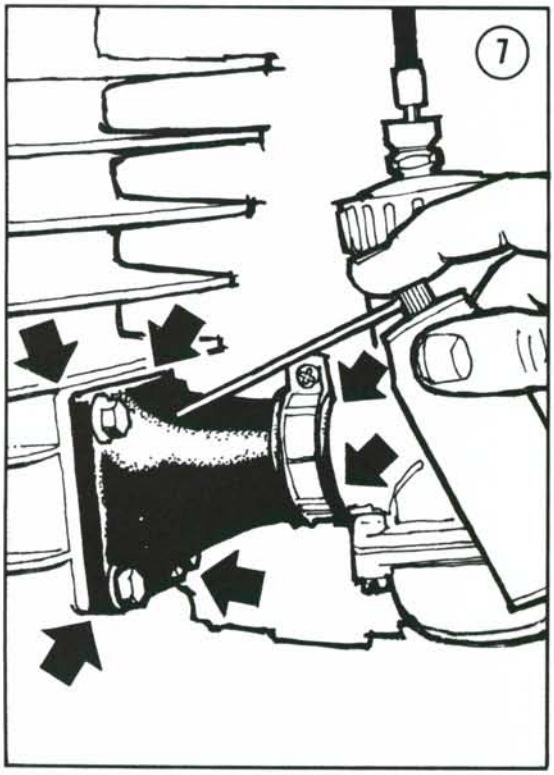
PREIGNITION
- Appearance — Melted ground electrode.
- Caused by—Overadvanced ignition timing, inoperative ignition advance mechanism, too low of a fuel octane rating, lean fuel/air mixture or carbon deposits in combustion chamber.

PREIGNITION
- Appearance—Melted center electrode.
- Caused by—Abnormal combustion due to overadvanced ignition timing or incorrect advance, too low of a fuel octane rating, lean fuel/air mixture, or carbon deposits in combustion chamber.
- Correct engine problem and replace with new plugs.

INCORRECT HEAT RANGE
- Appearance—Melted center electrode and white blistered insulator tip.
- Caused by—Incorrect plug heat range selection.
- Replace with new plugs.


4
IGNITION:
Turn switches on. Remove spark plug and check for spark outside cylinder
SPARK
NO SPARK
Check with good plug
SPARK
NO SPARK
Check high tension lead
SPARK
NO SPARK
Check coil connections
SPARK
NO SPARK
Check point or air gap
SPARK
NO SPARK
Refer to electrical chapter for correction
5
COMPRESSION:
Check head bolt torque
Check compression (dry test)
OK
Low
Check compression (wet test)
Refer to engine chapter for correction





Crank the engine several times to distribute the oil and test the compression once again. If it is now significantly higher, the rings and bore are worn. If the compression did not change, the valves are not seating correctly. Adjust the valves and check again. If the compression is still low, refer to the engine chapter.

NOTE: *Low compression indicates a developing problem. The condition causing it should be corrected as soon as possible.*

POOR PERFORMANCE

Poor engine performance can be caused by any of a number of things related to carburetion, ignition, and the condition of the sliding and rotating components in the engine. In addition, components such as brakes, clutch, and transmission can cause problems that seem to be related to engine performance, even when the engine is in top running condition.

Poor Idling

Idling that is erratic, too high, or too low is most often caused by incorrect adjustment of the carburetor idle circuit. Also, a dirty air filter or an obstructed fuel tank vent can affect idle speed. Incorrect ignition timing or worn or faulty ignition components are also good possibilities.

First, make sure the air filter is clean and correctly installed. Then, adjust the throttle cable free play, the throttle stop screw, and the idle mixture air screw **(Figure 6)** as described in the routine maintenance chapter.

If idling is still poor, check the carburetor and manifold mounts for leaks; with the engine warmed up and running, spray WD-40 or a similar light lube around the flanges and joints of the carburetor and manifold **(Figure 7)**. Listen for changes in engine speed. If a leak is present, the idle speed will drop as the lube "plugs" the leak and then pick up again as it is drawn into the engine. Tighten the nuts and clamps and test again. If a leak persists, check for a damaged gasket or a pinhole in the manifold. Minor leaks in manifold hoses can be repaired with silicone sealer, but if cracks or holes are extensive, the manifold should be replaced.

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CHAPTER THREE

LUBRICATION AND MAINTENANCE

To gain the utmost in safety, performance, and useful life from your motorcycle, it is necessary to make periodic inspections and adjustments. It frequently happens that minor problems found during such inspections are simple and inexpensive to correct at the time, but could lead to major failures later. This chapter describes such services.

Table 1 is a suggested maintenance schedule.

ENGINE TUNE-UP

The purpose of a tune-up is to restore power and performance lost over a gradual period of time due to normal wear.

Carry out the tune-up in the same sequence as in this chapter for best results.

Cam Chain Adjustment

Engine valves and breaker points are opened and closed by a chain-driven camshaft. Wear in this chain results in altered valve and ignition timing, so it is necessary to adjust chain tension periodically.

1. Remove alternator cover (**Figure 1**).
2. Place a wrench on the alternator rotor retaining nut and rotate engine counterclockwise until all valves are closed (this occurs when the LT mark on the rotor is 90 degrees past the index pointer). Refer to **Figure 2**. If valves are still open, continue to rotate engine another full turn.
3. Refer to **Figure 3**. Loosen locknut, then loosen tensioner bolt. Chain slack will automatically be taken up by the tensioner mechanism.
4. Tighten and hold bolt with a wrench while you tighten locknut.

Table 1 MAINTENANCE SCHEDULE

Maintenance Item	Miles 1,000	3,000	6,000
Engine tune-up		X	
Check battery	X		
Change oil	X	X	X
Service oil filter			X
Adjust clutch		X	
Check lights and horn	X		
Adjust chain	X		
Adjust brakes	X		
Check brake lining			X
Check wheels	X		
Check tires	X		
Change fork oil		X	
Grease wheel bearings			X
Check steering bearings			X
Grease swing arm		X	

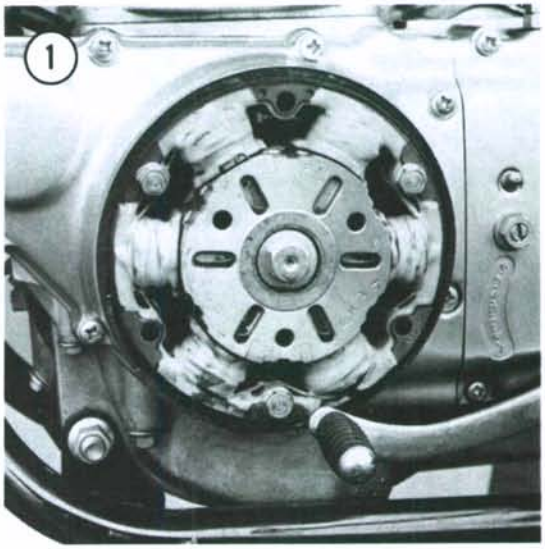
Valve Adjustment

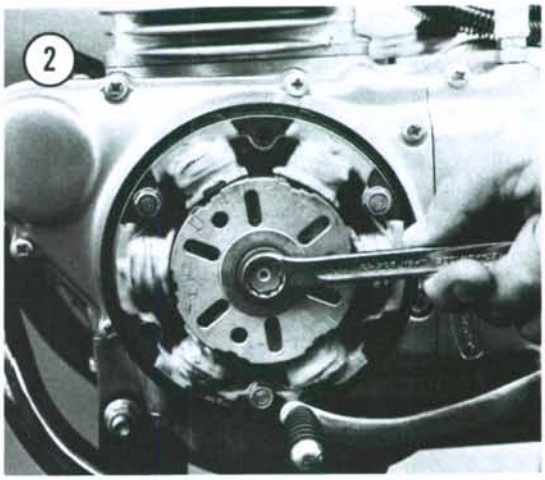
Valves must be adjusted while the engine is cold.

1. Open seat and raise rear of fuel tank (**Figure 4**).
2. Remove alternator cover (refer to **Figure 1**).
3. Remove tappet covers (**Figure 5**).
4. Place a wrench on the alternator rotor bolt and turn engine counterclockwise until left cylinder intake valve opens fully, then starts to close. Continue turning engine from this point until LT mark on alternator rotor aligns with the index pointer (**Figure 6**). Note that both valves for the left cylinder are fully closed at this point.
5. Insert a feeler gauge between tappet adjuster screw and valve stem. The intake valve clearance should be 0.002 in. (0.05mm), and the exhaust valve clearance 0.003 in. (0.08mm).
6. If clearance is not correct, refer to **Figure 7**. Loosen locknut, then turn adjustment screw to produce a slight drag on the feeler gauge. Hold screw in position and tighten locknut.

> NOTE: *Clearance may change when locknut is tightened, so recheck adjustment and readjust if necessary.*

7. After both left cylinder valves are adjusted, turn engine counterclockwise (180 degrees) until T mark on rotor aligns with index. Adjust right cylinder valves (follow Steps 5 and 6, preceding).



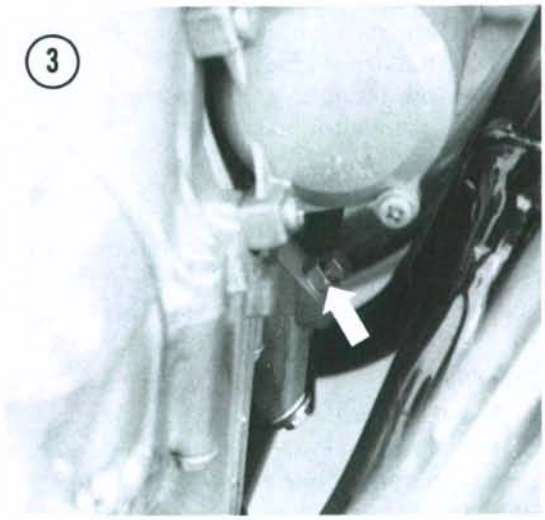


Compression Test

An engine requires adequate compression to develop full power. If for any reason compression is low, the engine will not develop full power. A compression test, or even better, a series of them over the life of the motorcycle, will tell much about engine condition.

To carry out a compression test, proceed as follows:

1. Start the engine, then ride the bike long enough to warm it thoroughly.
2. Remove each spark plug (refer to *Spark Plug Inspection and Service,* following section).
3. Screw a compression gauge into the spark plug hole, or if a press-in type gauge is used, hold it firmly in position (**Figure 8**).



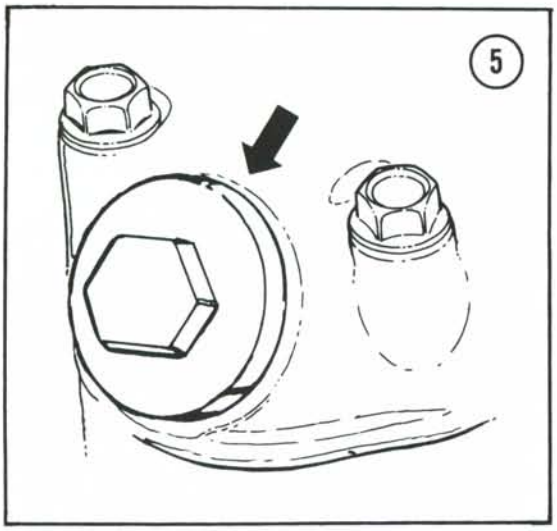


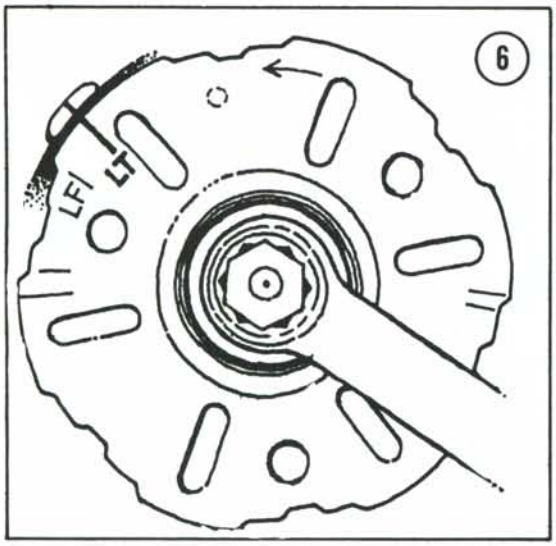
4. With the ignition switch OFF, and the throttle wide open, crank the engine briskly with the kickstarter several times; the compression gauge indication will increase with each kick. Continue to crank the engine until the gauge shows no more increase, then record the gauge indication. For example, on the first kick the gauge might indicate 90 psi; the second kick, 140 psi; the third kick, 160 psi, etc.

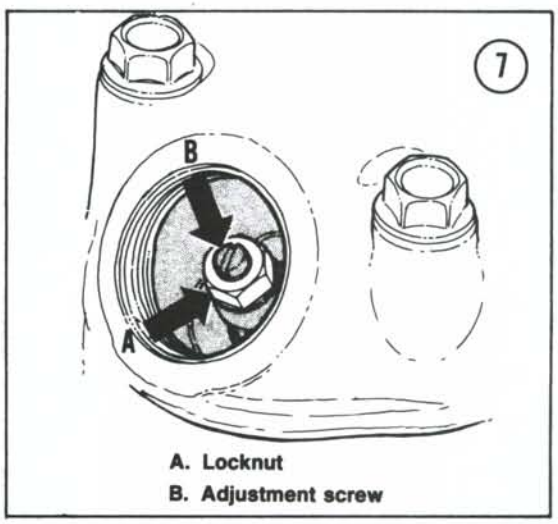
5. Repeat this procedure for the remaining cylinder. Normal compression pressure at sea level will be about 140-170 psi, decreasing with altitude.

A sudden drop in cylinder compression could be caused by many factors, most of which require major engine service. Some of these causes are worn piston rings, a leaking cylinder head gasket, or a leaking valve.

A quick check for worn piston rings is easy: pour a spoonful of heavy engine oil through the spark plug opening. The oil will flow over the







A. Locknut
B. Adjustment screw



head of the piston, temporarily sealing the piston rings. Repeat the compression test for that cylinder. If compression comes up to normal (or near normal), it is an indication that the rings are worn, or the cylinder defective.

If compression remains low after pouring oil into the spark plug hole and repeating the compression test, it is likely that a valve or head gasket is leaking. (A rapid on-off squeal when the engine is running frequently accompanies this condition.)

On Honda twins, a difference of 25 percent in compression measurements between cylinders should be taken as an indication that engine repairs should be made. Likewise, a difference of 25 percent between successive measurements on any cylinder over a period of time (if made under identical conditions) is also an indication of trouble.

Table 2 may be used as a quick reference when checking cylinder compression pressures. It has been calculated so that the lowest reading number is 75 percent of the highest reading number.

Example: After checking the compression pressures in all cylinders it was found that the highest pressure obtained was 150 psi. The lowest pressure reading was 140 psi. By locating 150 in the maximum column, it is seen that the minimum allowable pressure is 113. Since the lowest reading obtained was 140 psi, the compression is within satisfactory limits.

Spark Plug Inspection and Service

Spark plugs are available in various heat ranges hotter or colder than the spark plug originally installed at the factory.

Select plugs of a heat range designed for the loads and temperature conditions under which the engine will run. Use of incorrect heat ranges can cause seized pistons, scored cylinder walls, or damaged piston crowns.

In general, use a low-numbered plug for low speeds, low loads, and low temperatures. Use a higher-numbered plug for high speeds, high engine loads, and high temperatures.

NOTE: *Use the highest numbered plug that will not foul. In areas where seasonal temperature variations are great, the factory recommends using a high-numbered plug for slower winter operation.*

The reach (length) of a plug is also important. A longer-than-normal plug could interfere with the piston, causing severe damage. Refer to **Figures 9 and 10**.

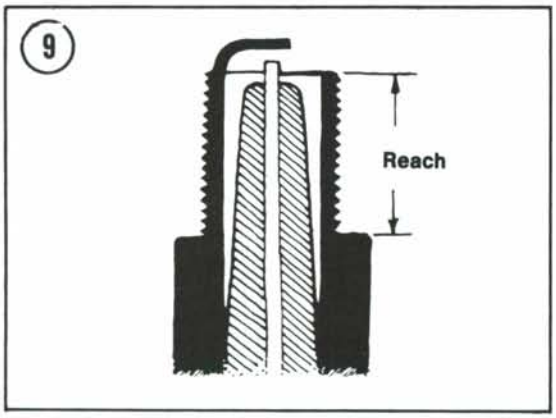
Spark plugs of the correct heat range, with the engine in a proper state of tune, will appear light tan. See the color illustrations in Chapter Two for the various spark plug conditions you might encounter.

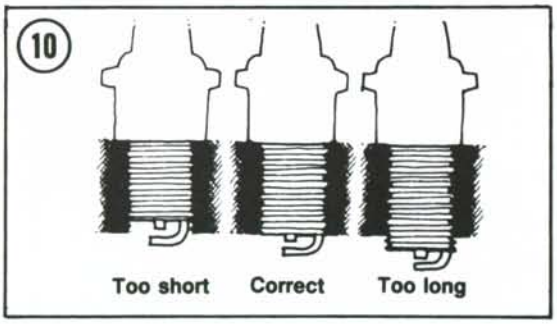
Changing spark plugs is generally a simple operation. Occasionally heat and corrosion can cause the plug to bind in the cylinder head, making removal difficult. Do not use force; the head is easily damaged. Here is the proper way to replace a plug.

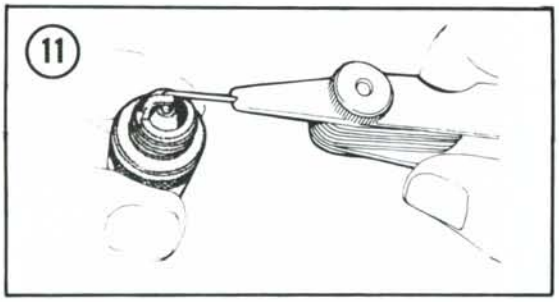
1. Blow out any debris which has collected in the spark plug wells. It could fall into the hole and cause damage.

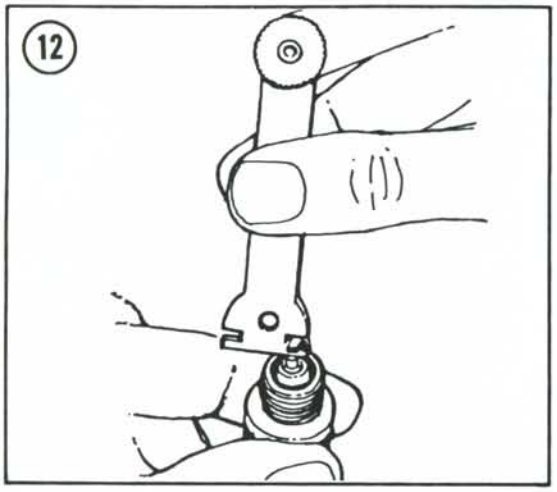
Table 2 COMPRESSION PRESSURE LIMITS

Pressure (psi)		Pressure (psi)	
Maximum	Minimum	Maximum	Minimum
134	101	188	141
136	102	190	142
138	104	192	144
140	105	194	145
142	107	196	147
146	110	198	148
148	111	200	150
150	113	202	151
152	114	204	153
154	115	206	154
156	117	208	156
158	118	210	157
160	120	212	158
162	121	214	160
164	123	216	162
166	124	218	163
168	126	220	165
170	127	222	166
172	129	224	168
174	131	226	169
176	132	228	171
178	133	230	172
180	135	232	174
182	136	234	175
184	138	236	177
186	140	238	178









2. Gently remove the spark plug leads by pulling up and out on the cap. Do not jerk or pull on the wire itself.

3. Apply penetrating oil to the base of the plug and allow it to work into the threads.

4. Back out the plugs with a socket that has a rubber insert designed to grip the insulator. Be careful not to drop the plugs where they could become lodged.

NOTE

Be sure that you remember which cylinder each spark plug came out of. The condition of the spark plug is an indication of engine condition and can warn of developing trouble that can be isolated by cylinder.

5. Remove the spark plug gaskets from the spark plug holes. Clean the seating area after removal, being careful that dirt does not drop into the spark plug hole.

6. Remove grease and dirt from the insulator with a clean rag. Inspect the insulator and body of each spark plug for signs of cracks and chips. Replace if defective.

NOTE: *If one plug is found unsatisfactory, replace both of them.*

7. Clean the tips of the plugs with a sandblasting machine (some gas stations have them) or a wire brush and solvent.

8. File the center electrode flat. Clean and file all surfaces of the outer electrode. All surfaces should be clean, flat, and smooth.

9. Use a round feeler gauge (Figure 11) and adjust the clearance between the electrodes to 0.028-0.032 in. (0.70-0.80 mm) for all models. See Figure 12.

CAUTION

Do not bend the inner electrode or damage to the insulator may result.

10. Use a new gasket if the old plugs are to be reused after cleaning. Apply a dab of graphite to the spark plug threads to simplify future removal.

11. Thread the plugs into the spark plug holes finger-tight, then tighten ¼ turn more with a wrench. Further tightening will flatten the gasket and cause binding. (If a torque wrench is available, tighten spark plugs to 15 ft.-lb.).

Breaker Points

Normal use of a motorcycle causes the breaker points to burn and pit gradually. If they are not pitted too badly, they can be dressed with a few strokes of a clean point file.

CAUTION

Do not use emery cloth or sandpaper to dress the points as particles can remain on the points and cause arcing and burning.

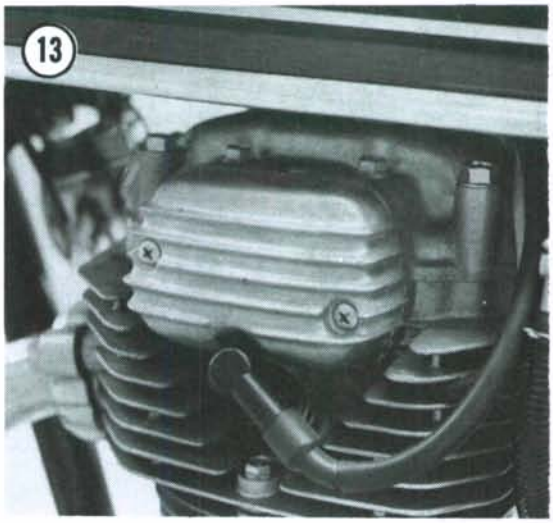
If a few strokes of the file do not smooth the points completely, replace them.

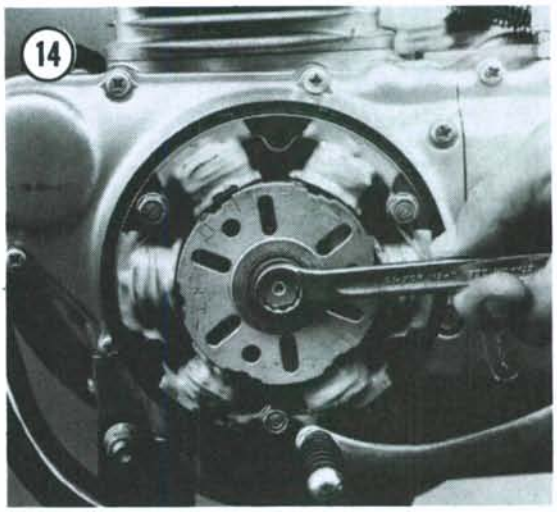
Oil or dirt may get on the points, resulting in poor performance or even premature failure. Common causes for this condition are defective oil seals, improper or excessive breaker cam lubrication, or lack of care when the breaker point cover is removed.

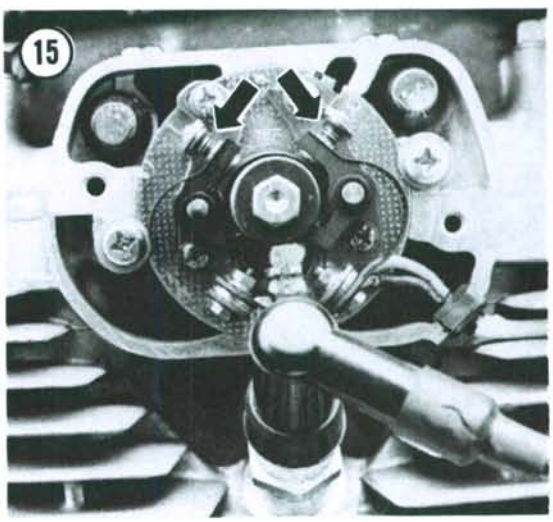
Points should be cleaned and regapped every 1,500-2,000 miles (2,000-3,000 kilometers). To clean the points, first dress them lightly with a clean point file, then remove all residue with lacquer thinner. Close the points on a piece of clean white paper (such as a business card). Continue to pull the card through the closed points until no discoloration or residue remains on the card. Finally, rotate the engine and observe the points as they open and close. If they do not meet squarely, replace them.

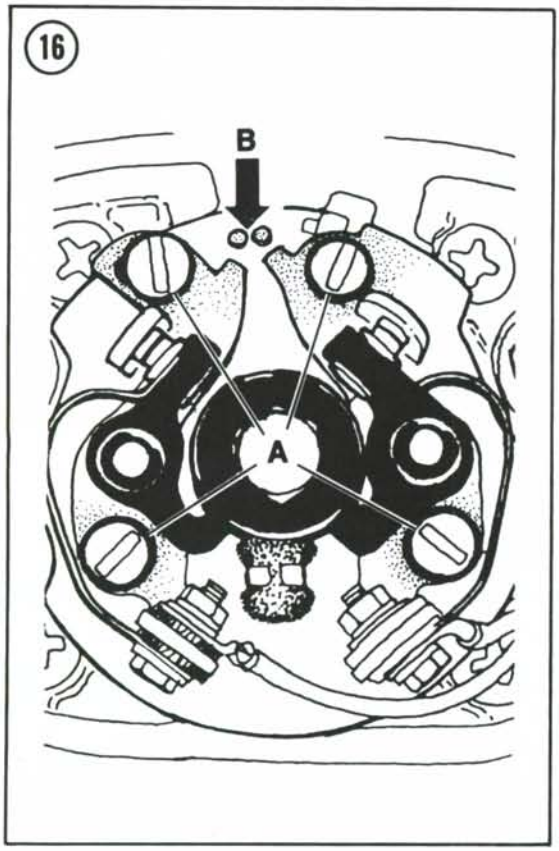
To adjust the points, proceed as follows.

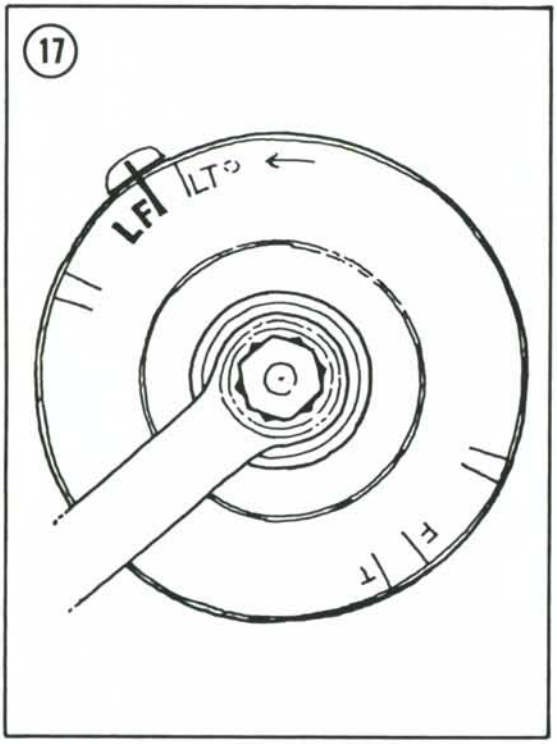
1. Remove breaker point cover (**Figure 13**).
2. Remove the alternator cover (**Figure 14**) and turn engine over until one set of points is open to the maximum gap.
3. Measure the breaker point gap with a feeler gauge (**Figure 15**). Point gap should be 0.012-0.016 in. (0.30-0.40mm). If so, go on to Step 7. If adjustment is necessary, continue with Steps 4 through 9.
4. Refer to A, **Figure 16**. Slightly loosen breaker point retaining screws.
5. Insert a screwdriver into pry slots (B, **Figure 16**), then move the stationary contact so that the point gap is 0.014 in. (0.35 mm).
6. Tighten both retaining screws then check gap again. Readjust if necessary.

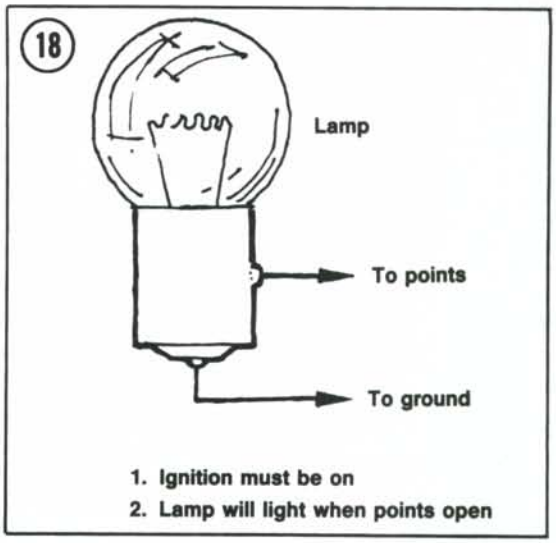












7. Repeat Steps 2 through 6 on remaining set of points.

8. Wipe the breaker cam clean, then apply a very small quantity of breaker cam lubricant. Apply just enough to create an oil film on the cam; more may cause point failure. This lubricant is sold at any auto parts store.

9. Adjust ignition timing (refer to *Ignition Timing,* following section).

To replace breaker points, disconnect wire which is attached to the movable contact, then remove both retaining screws. Be sure to adjust point gap and ignition timing after installation.

Ignition Timing

Any change in breaker point gap, either from normal wear or from breaker point service, affects ignition timing. If spark plugs fire too early, severe engine damage may result. Overheating and loss of power will occur if the spark occurs too late.

1. Remove the breaker point cover and alternator cover (refer to **Figures 13 and 14**).

2. Place a wrench on the alternator bolt and turn the engine over until the LF mark on the alternator rotor aligns with the index pointer **(Figure 17)**.

3. Connect a timing tester to the left-hand breaker point terminal and a good ground (follow the manufacturer's hook-up instructions). If no timing tester is available, make up a test lamp as shown in **Figure 18**.

4. Loosen both of the left-hand points base plate retaining screws (A, **Figure 19**) just enough so that the base plate can be moved slightly.

5. Insert a screwdriver in the pry slots (refer to B, **Figure 19**) and rotate the base plate until the left-hand points just begin to open. (If a test lamp is used to determine point opening, be sure that the ignition switch is ON.) The test lamp will light exactly at the moment that the LF mark on the alternator rotor aligns with the index pointer, if the ignition timing is correct.

6. Tighten both base plate retaining screws (refer to A, **Figure 19**).

7. Recheck adjustment by turning rotor clockwise slightly, then counterclockwise slowly. The LF mark and index should align just as the left-hand points open (and the test lamp lights up). Readjust if necessary.

8. Turn rotor counterclockwise until F mark aligns with the index (**Figure 20**).

9. Connect the timing tester to the right-hand points.

10. Slightly loosen both right-hand stationary breaker contact retaining screws, then pry stationary contact slightly one way or the other until the points just begin to open.

NOTE: *The point gap will change slightly; this is normal.*

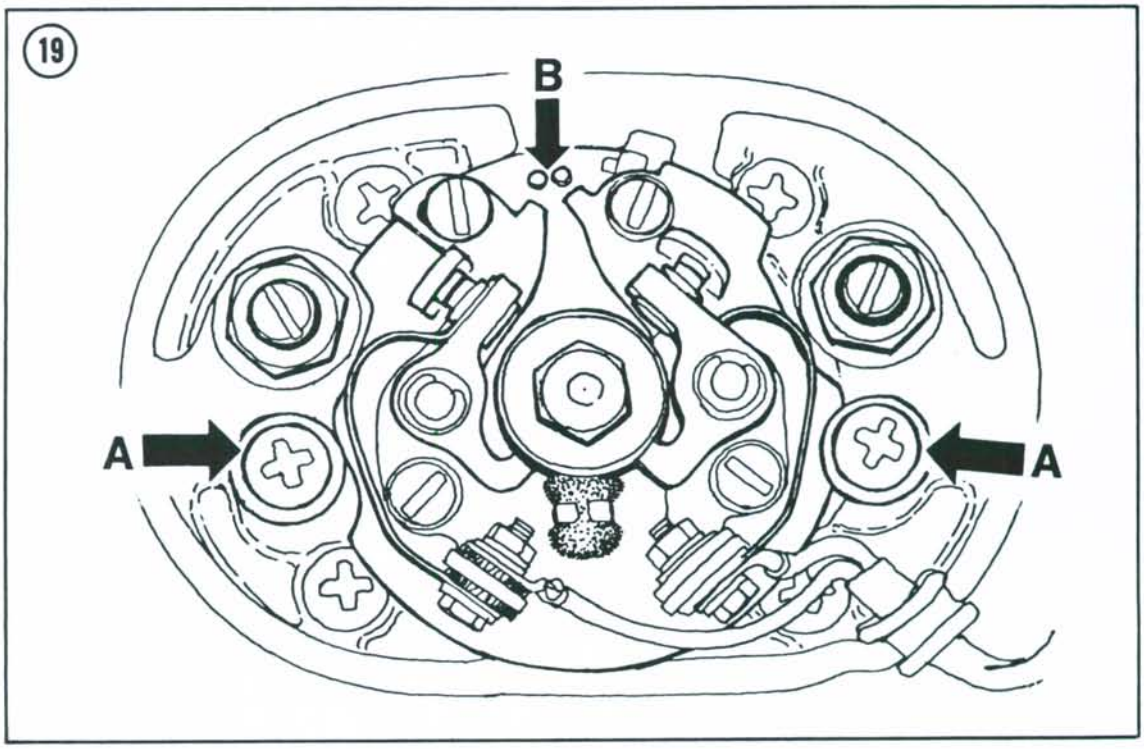
11. Tighten both retaining screws.

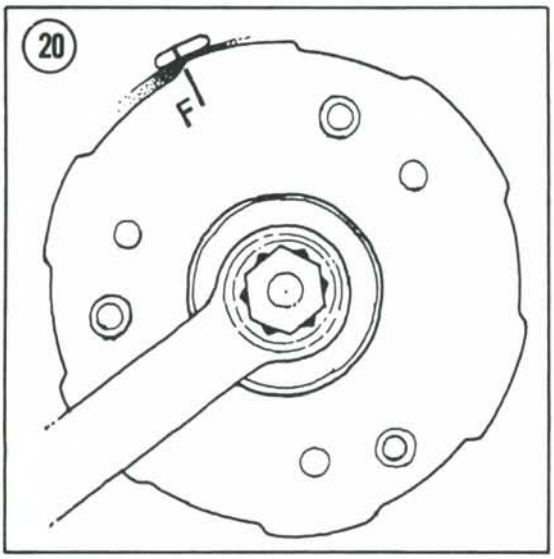
12. Recheck adjustment by turning rotor clockwise slightly, then counterclockwise slowly. The right-hand points should open just as the F mark and index align. Readjust if necessary.

Air Cleaner Service

During the tune-up, the air cleaner element should be cleaned or replaced.

1. Remove the clamps and retaining nuts and lift the air cleaner off (**Figure 21** and **Figure 22**).
2. Remove the element and tap it gently against the palm of your hand to dislodge dirt from the outside. Then blow compressed air gently from the inside. Replace a damaged element or one that is too dirty to clean satisfactorily.
3. Install by reversing the preceding steps.





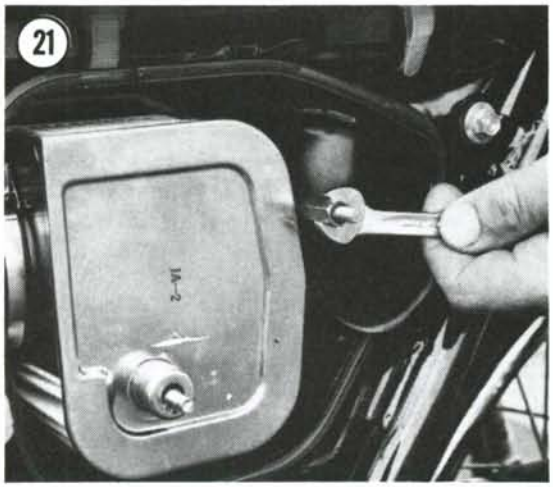
Carburetor Idle Adjustment

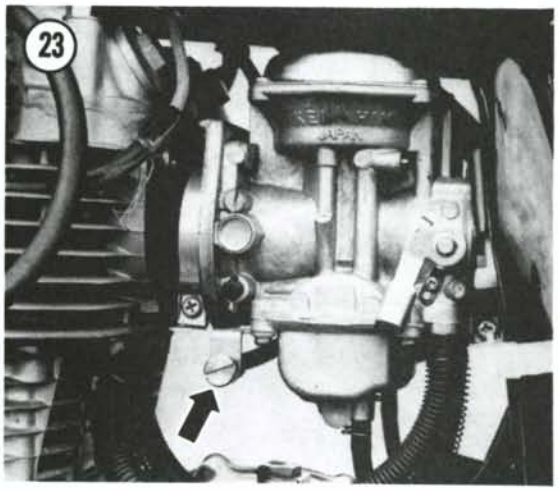
1. Start the engine and let it reach normal operating temperature. Usually 10-15 minutes of stop-and-go riding is sufficient. Turn the engine off.

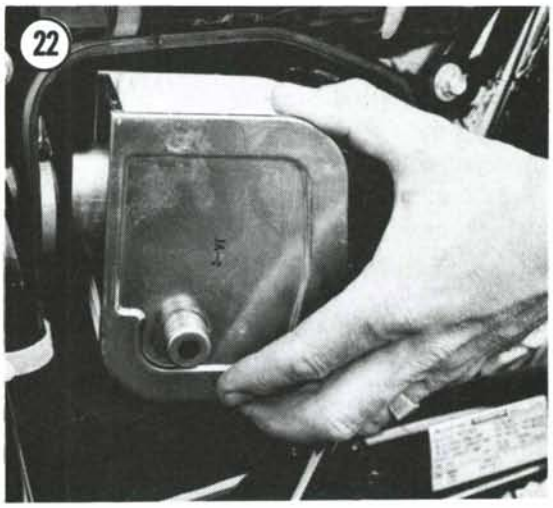
2. Connect a portable tachometer following the manufacturer's instructions.

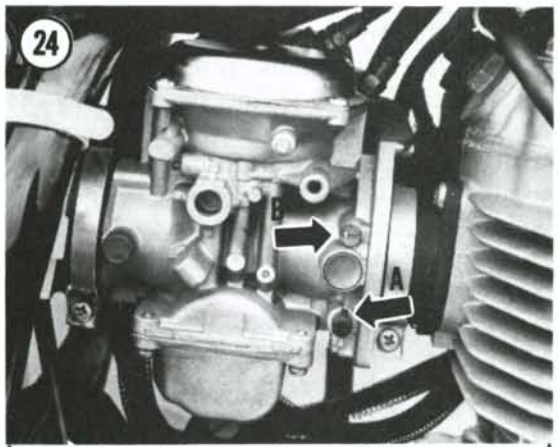
3. Start the engine and turn the idle speed adjust screw (**Figure 23**) to achieve an idle speed of 1,200 +/-100 rpm.

4. Turn the right-hand carburetor pilot screw (idle mixture screw) slowly in either direction until engine idle speed is at its maximum (A, **Figure 24**).



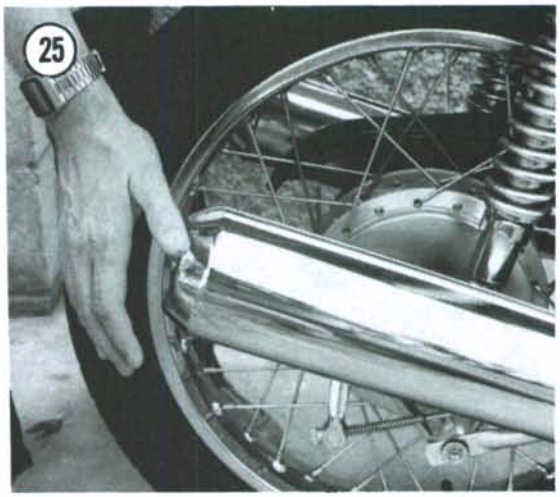






A. Right-hand carburetor pilot screw
B. Vacuum plug

5. Turn the left-hand carburetor pilot screw (idle mixture screw) slowly in either direction until engine idle speed is at its maximum.
6. Readjust the engine idle speed by repeating Step 3.
7. After performing this adjustment, if the proper idle speed cannot be achieved or if the exhaust back pressure from both mufflers is not uniform (**Figure 25**), the carburetors must be synchronized as described in this chapter.



Carburetor Synchronization

Prior to synchronizing the carburetors, the air cleaner must be cleaned and the ignition timing and valve clearance must be properly adjusted.

This procedure requires a special tool called a mercury manometer (carb-sync tool). This is a tool that measures the manifold vacuum for both cylinders simultaneously. A carb-sync tool can be purchased from a Honda dealer, a motorcycle supply store or mail order firm starting at about $25.

NOTE

When purchasing this tool, check that it is equipped with restrictors. These restrictors keep the mercury from being drawn into the engine when engine rpm is increased during the adjustment procedure. If the mercury is drawn into the engine, the tool will have to be replaced.

1. Start the engine and warm it up to normal operating temperature. Turn the engine off.
2. Remove both side covers and remove the seat.
3. Turn the fuel shutoff valve to the OFF position and remove the fuel line to the carburetors.
4. Remove the fuel tank from its rear rubber mount; lift the fuel tank up and to the rear. Make sure that no electrical wires are snagged by the tank and remove the fuel tank.
5. Remove the vacuum plug on the carburetor intake throat (B, **Figure 24**) of each carburetor.
6. Connect the vacuum lines from the carb-sync tool to the carburetors, following the manufacturer's instructions. Most carb-sync tools are designed for use with a maximum of 4 cylinders. Use the hoses and gauges for the No. 1 and No. 2 cylinders. Most carb-sync tools have the cylinder number indicated on them adjacent to each tube containing mercury.

NOTE

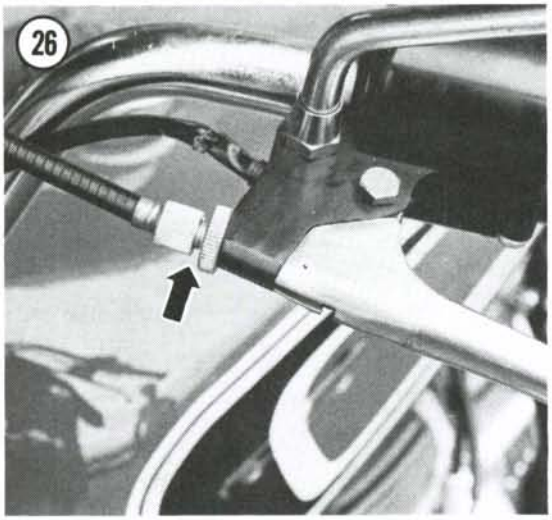
The No. 2 carburetor (right-hand side) has no synchronization screw; the No. 1 (left-hand side) carburetor must be synchronized to it.

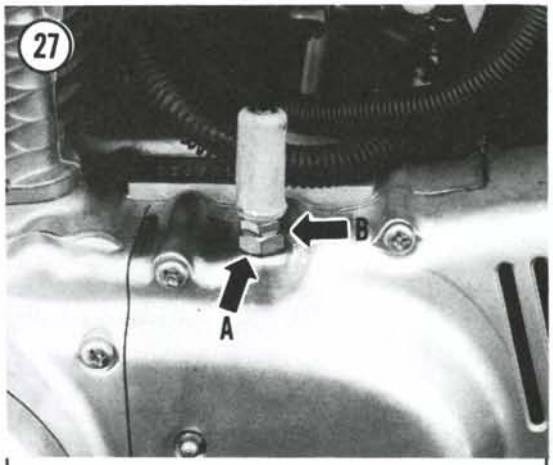
7. Start the engine and let it idle at 1,200 rpm +/-100 rpm. There should be enough fuel in the float bowls to run the bike for this procedure.

WARNING

Do not rig up a temporary fuel supply as this presents a real fire danger.

8. If you start to run out of fuel during the test, shut off the engine. Reinstall the fuel tank and refill the carburetor float bowls; remove the fuel tank, restart the engine and proceed with the test.
9. The gauge readings should be between 16-24 cm Hg for both carburetors. If the difference in gauge readings is 2.0 cm Hg or less between the 2 cylinders, the carburetors are considered synchronized. If not, proceed as follows.
10. Using an open-end wrench and screwdriver, loosen the locknut and turn the adjusting screw on the No. 1 carburetor. Turn the adjusting screw until the reading is the





A. Locknut B. Adjuster nut

same as the No. 2 carburetor. Tighten the locknut. Open the throttle a little and close it back down after each adjustment.

CAUTION

If your carb-sync tool is not equipped with restrictors, open and close the throttle very gently to avoid sucking mercury into the engine. If this happens, it will not harm the engine but will render the tool useless.

NOTE

To gain the utmost in performance and efficiency from the engine, adjust the carburetors so that the gauge readings are as close to each other as possible.

11. After the carburetors are adjusted properly, tighten the locknut.
12. Shut off the engine and remove the vacuum lines. Install the vacuum plug on each carburetor intake throat (B, **Figure 24**). Make sure they are in tight to prevent a vacuum leak.
13. Install the fuel tank, seat and side covers.
14. Restart the engine and readjust the idle speed if necessary; refer to *Carburetor Idle Adjustment* in this chapter.

CLUTCH ADJUSTMENT

Adjust the clutch at 1,000 mile (1,500 kilometer) intervals or whenever clutch operation is erratic.

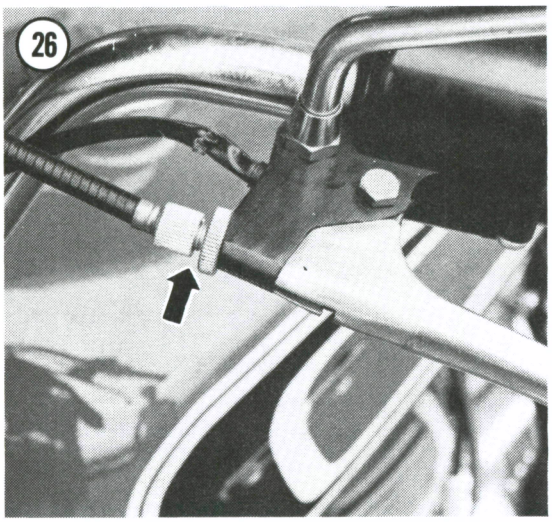
1. At the clutch lever on the handlebar, loosen the locknut and turn the upper cable adjuster until the cable is all of the way into the clutch lever bracket (**Figure 26**). Tighten the locknut.
2. At the clutch mechanism on the engine, loosen the locknut (A, **Figure 27**) and turn the adjuster nut (B, **Figure 27**) clockwise (looking down onto the adjuster nut) all the way down onto the locknut. This will allow maximum clutch cable slack.

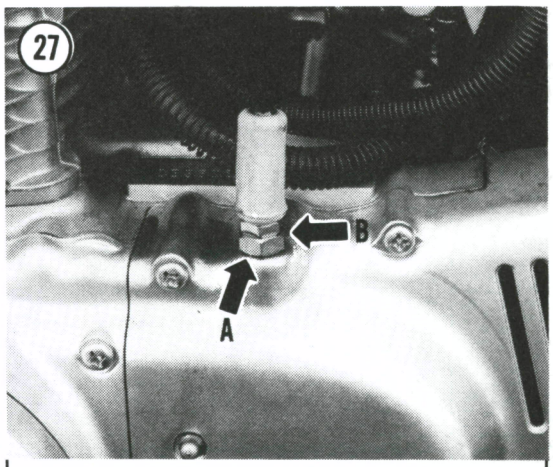
NOTE

In the following steps, make sure that the locknut does not rub against the crankcase cover while turning the adjuster screw. If the locknut comes in contact with the cover, it will give a false resistance indication and proper adjustment cannot be achieved.

3. On the left-hand crankcase cover, loosen the locknut (A, **Figure 28**) until it is flush with the outside surface of the adjuster screw (B, **Figure 28**).
4. Turn the adjuster screw (B, **Figure 28**) counterclockwise until a slight resistance is felt, then stop.
5. From this point, turn the adjuster screw clockwise 1/4 turn, hold it in this position and tighten the locknut. Make sure the adjuster screw does not move while tightening the locknut.
6. At the clutch mechanism on the engine, turn the adjuster nut (B, **Figure 27**)

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A. Locknut B. Adjuster nut

same as the No. 2 carburetor. Tighten the locknut. Open the throttle a little and close it back down after each adjustment.

CAUTION

If your carb-sync tool is not equipped with restrictors, open and close the throttle very gently to avoid sucking mercury into the engine. If this happens, it will not harm the engine but will render the tool useless.

NOTE

To gain the utmost in performance and efficiency from the engine, adjust the carburetors so that the gauge readings are as close to each other as possible.

11. After the carburetors are adjusted properly, tighten the locknut.
12. Shut off the engine and remove the vacuum lines. Install the vacuum plug on each carburetor intake throat (B, **Figure 24**). Make sure they are in tight to prevent a vacuum leak.
13. Install the fuel tank, seat and side covers.
14. Restart the engine and readjust the idle speed if necessary; refer to *Carburetor Idle Adjustment* in this chapter.

CLUTCH ADJUSTMENT

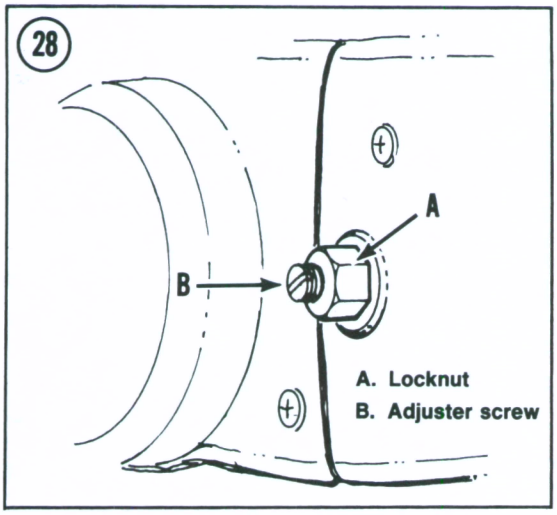
Adjust the clutch at 1,000 mile (1,500 kilometer) intervals or whenever clutch operation is erratic.

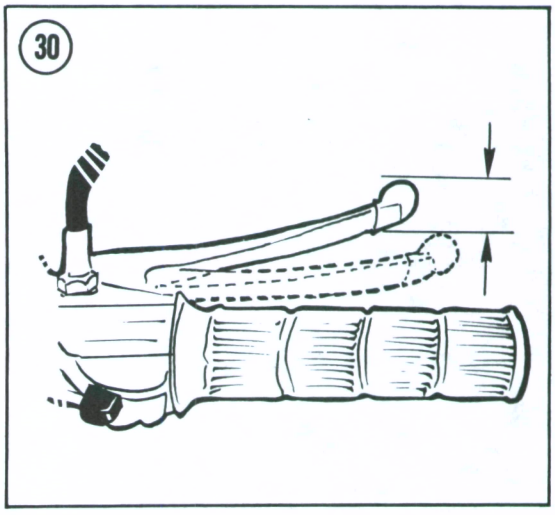
1. At the clutch lever on the handlebar, loosen the locknut and turn the upper cable adjuster until the cable is all of the way into the clutch lever bracket (**Figure 26**). Tighten the locknut.
2. At the clutch mechanism on the engine, loosen the locknut (A, **Figure 27**) and turn the adjuster nut (B, **Figure 27**) clockwise (looking down onto the adjuster nut) all the way down onto the locknut. This will allow maximum clutch cable slack.

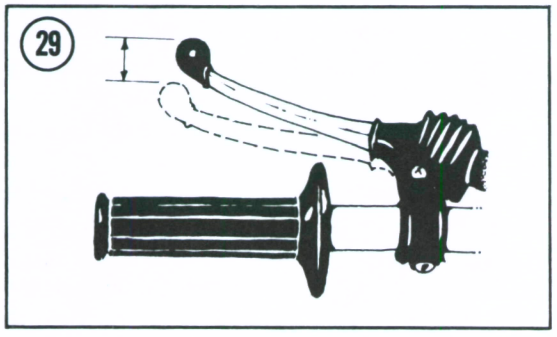
NOTE

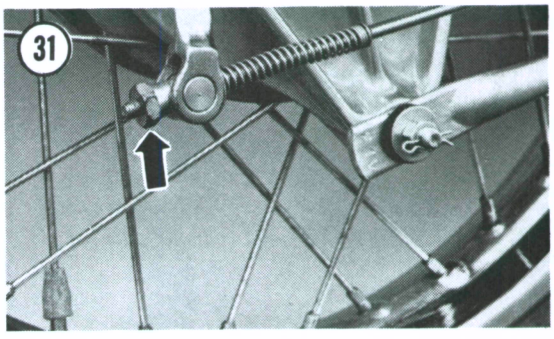
In the following steps, make sure that the locknut does not rub against the crankcase cover while turning the adjuster screw. If the locknut comes in contact with the cover, it will give a false resistance indication and proper adjustment cannot be achieved.

3. On the left-hand crankcase cover, loosen the locknut (A, **Figure 28**) until it is flush with the outside surface of the adjuster screw (B, **Figure 28**).
4. Turn the adjuster screw (B, **Figure 28**) counterclockwise until a slight resistance is felt, then stop.
5. From this point, turn the adjuster screw clockwise 1/4 turn, hold it in this position and tighten the locknut. Make sure the adjuster screw does not move while tightening the locknut.
6. At the clutch mechanism on the engine, turn the adjuster nut (B, **Figure 27**)









counterclockwise (looking down onto the adjuster nut) until there is 0.4-0.8 in. (10-20 mm) of free play at the tip of the clutch lever (**Figure 29**). Tighten the locknut.

7. If necessary, perform any minor adjustment at the clutch lever on the handlebar. Loosen the locknut and turn the upper cable adjuster until the correct amount of free play is achieved. Tighten the locknut.

BRAKE ADJUSTMENT

Adjust the brakes every 1,000 miles (1,500 kilometers) or whenever necessary.

Front Disc Brake

The front disc brake requires no adjustment. As the brake pads wear, the brake fluid compensates.

Front Drum Brake

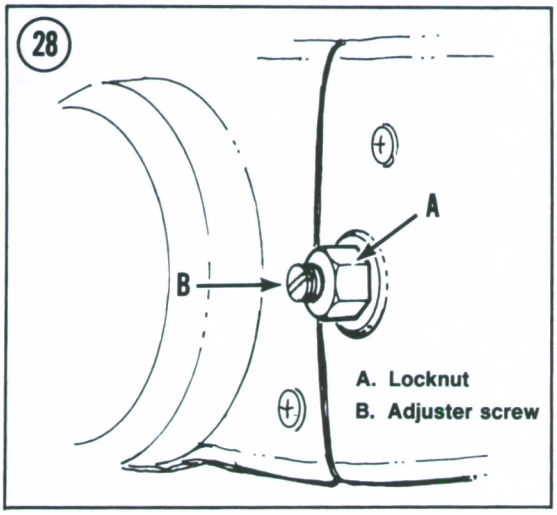
The front brake cable must be adjusted so there is 3/4-1 1/4 in. (20-30 mm) of brake lever movement required to actuate the brake but it must not be adjusted so closely that the brake shoes contact the drum when the lever is released.

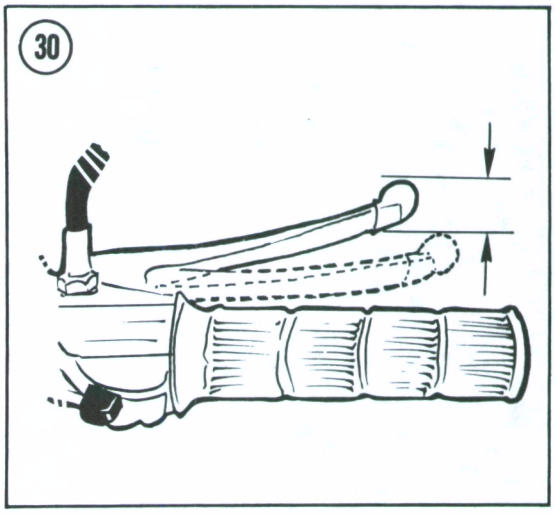
1. At the hand lever, loosen the locknut and turn the adjusting barrel in order to achieve the correct amount of free play (**Figure 30**).
2. If the correct amount of free play cannot be achieved at the hand lever, loosen the locknut and turn the adjusting barrel all the way in toward the hand grip. Tighten the locknut.
3. At the brake panel, loosen the locknut (front nut) and turn the adjust nut (rear nut) until the correct amount of free play is achieved. Tighten the locknut.
4. Minor adjustment may be made at the hand lever.

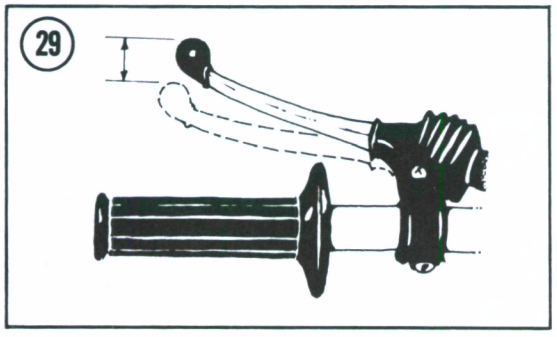
Rear Drum Brake

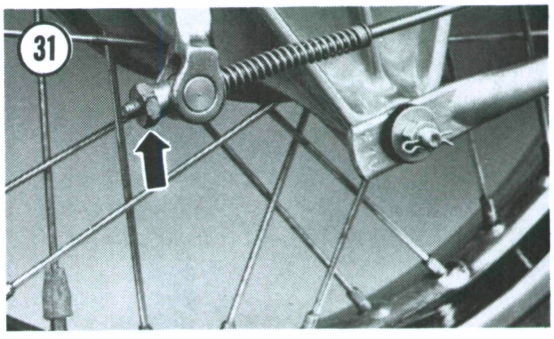
The rear drum brake is operated by a rod. The correct amount of free play is 3/4-1 in.

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counterclockwise (looking down onto the adjuster nut) until there is 0.4-0.8 in. (10-20 mm) of free play at the tip of the clutch lever (**Figure 29**). Tighten the locknut.

7. If necessary, perform any minor adjustment at the clutch lever on the handlebar. Loosen the locknut and turn the upper cable adjuster until the correct amount of free play is achieved. Tighten the locknut.

BRAKE ADJUSTMENT

Adjust the brakes every 1,000 miles (1,500 kilometers) or whenever necessary.

Front Disc Brake

The front disc brake requires no adjustment. As the brake pads wear, the brake fluid compensates.

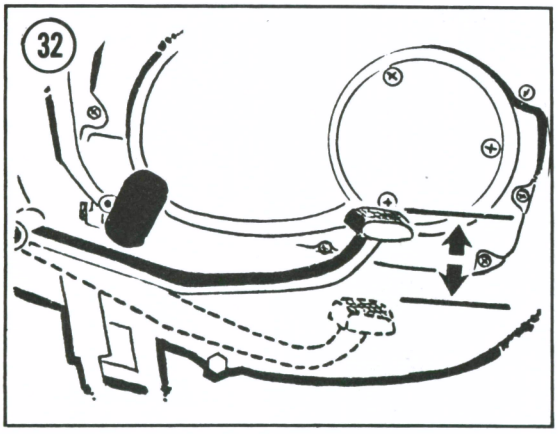
Front Drum Brake

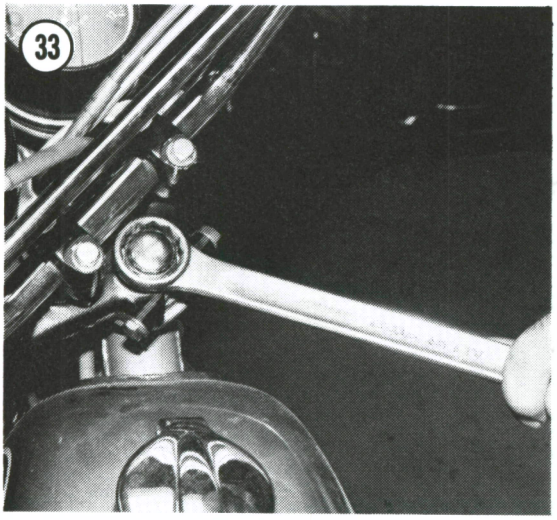
The front brake cable must be adjusted so there is 3/4-1 1/4 in. (20-30 mm) of brake lever movement required to actuate the brake but it must not be adjusted so closely that the brake shoes contact the drum when the lever is released.

1. At the hand lever, loosen the locknut and turn the adjusting barrel in order to achieve the correct amount of free play (**Figure 30**).
2. If the correct amount of free play cannot be achieved at the hand lever, loosen the locknut and turn the adjusting barrel all the way in toward the hand grip. Tighten the locknut.
3. At the brake panel, loosen the locknut (front nut) and turn the adjust nut (rear nut) until the correct amount of free play is achieved. Tighten the locknut.
4. Minor adjustment may be made at the hand lever.

Rear Drum Brake

The rear drum brake is operated by a rod. The correct amount of free play is 3/4-1 in.





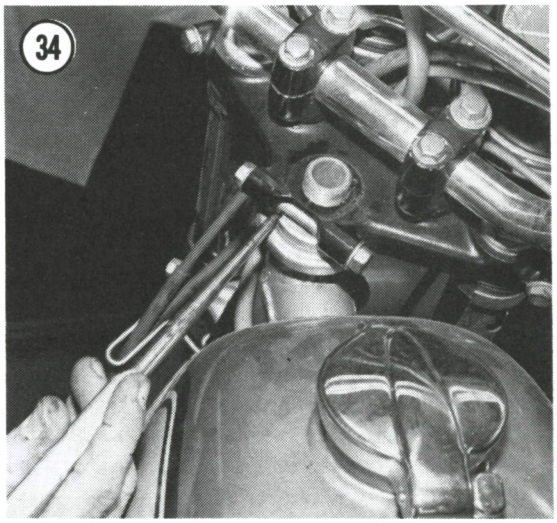
(20-25 mm). Turn the brake rod adjust nut at the rear brake panel arm (**Figure 31**) until the rear brake pedal has the specified free play (**Figure 32**).

STEERING STEM BEARINGS

Check steering bearings for looseness of binding. If any exists, find out the cause and correct it immediately. Refer to Chapter Seven, *Steering Stem* for repair procedures.

Adjustment

1. Remove steering stem nut (**Figure 33**).
2. Loosen pinch bolt, then tighten or loosen the ring nut by tapping it gently with a suitable drift until the steering stem turns freely throughout its full travel without excessive looseness or binding (**Figure 34**). Tighten the pinch bolt securely.
3. Tighten the steering stem nut securely; refer to **Figure 33**.



WHEELS AND TIRES

Check wheels for bent rims and loose or missing spokes. Complete wheel inspection and service procedures are detailed in *Wheels*, Chapter Seven.

Check tires for worn out treads, cuts and proper inflation. Refer to **Table 3**.

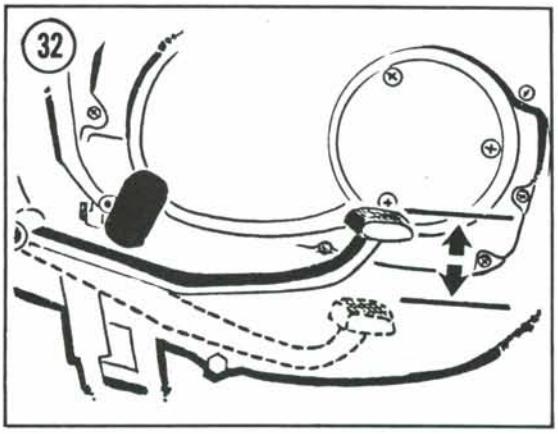
BATTERY

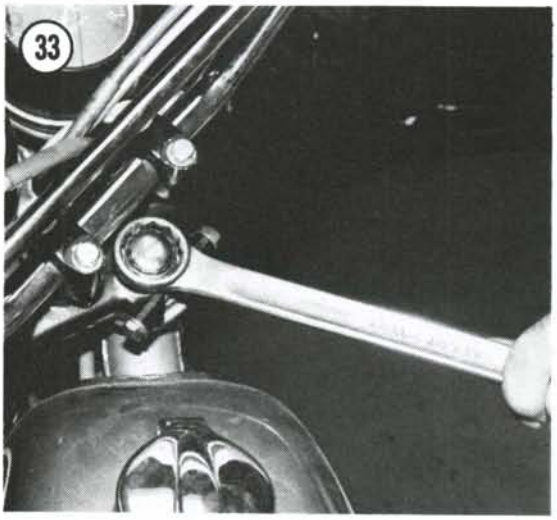
The battery should always be clean and the cells filled (but not overfilled) with distilled water. Most batteries are marked with electrolyte level limit lines. Always maintain the fluid level between these two lines. Distilled water is available at most supermarkets.

Overfilling leads to loss of electrolyte and results in poor battery performance, short life and excessive corrosion. Never allow the electrolyte level to fall below the top of the battery plates as the plates could become permanently damaged due to contact with air.

Excessive battery water consumption is an indication that the battery is being overcharged. The two most common causes of overcharging are high battery temperature or high voltage regulator setting.

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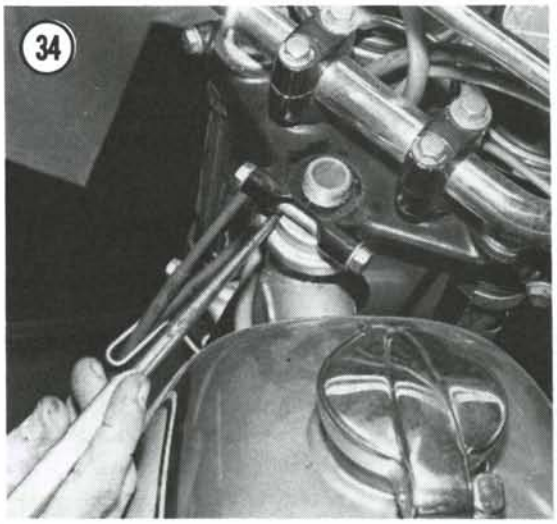
(20-25 mm). Turn the brake rod adjust nut at the rear brake panel arm (**Figure 31**) until the rear brake pedal has the specified free play (**Figure 32**).

STEERING STEM BEARINGS

Check steering bearings for looseness of binding. If any exists, find out the cause and correct it immediately. Refer to Chapter Seven, *Steering Stem* for repair procedures.

Adjustment

1. Remove steering stem nut (**Figure 33**).
2. Loosen pinch bolt, then tighten or loosen the ring nut by tapping it gently with a suitable drift until the steering stem turns freely throughout its full travel without excessive looseness or binding (**Figure 34**). Tighten the pinch bolt securely.
3. Tighten the steering stem nut securely; refer to **Figure 33**.



WHEELS AND TIRES

Check wheels for bent rims and loose or missing spokes. Complete wheel inspection and service procedures are detailed in *Wheels*, Chapter Seven.

Check tires for worn out treads, cuts and proper inflation. Refer to **Table 3**.

BATTERY

The battery should always be clean and the cells filled (but not overfilled) with distilled water. Most batteries are marked with electrolyte level limit lines. Always maintain the fluid level between these two lines. Distilled water is available at most supermarkets.

Overfilling leads to loss of electrolyte and results in poor battery performance, short life and excessive corrosion. Never allow the electrolyte level to fall below the top of the battery plates as the plates could become permanently damaged due to contact with air.

Excessive battery water consumption is an indication that the battery is being overcharged. The two most common causes of overcharging are high battery temperature or high voltage regulator setting.

WARNING

When working with batteries, use extreme care to avoid spilling or splashing electrolyte. This electrolyte is sulfuric acid which can destroy clothing and cause serious chemical burns. Neutralize spilled battery acid immediately with a solution of baking soda and water, then flush away with clean water. Safety glasses should be worn when working near a battery to avoid having electrolyte splashed into the eyes. If electrolyte comes into contact with the eyes, force the eyes open, flood with cool clean water for about 5 minutes and call a physician immediately.

Battery Charging

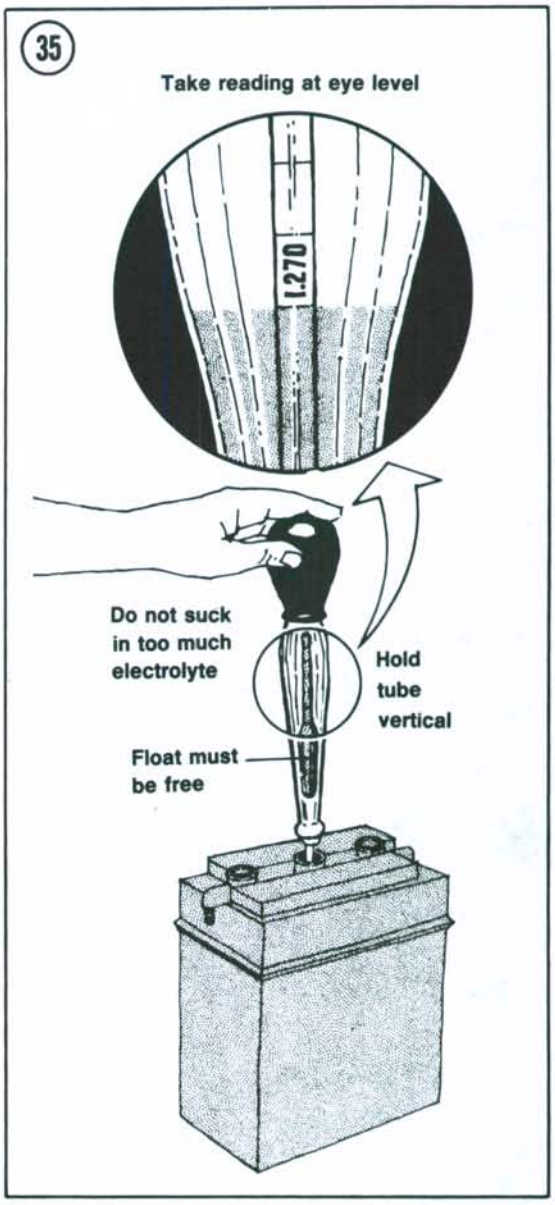
WARNING

When batteries are being charged, highly explosive gas forms in each cell. Some of this gas escapes through the filler openings and may form an explosive atmosphere around the battery which may last several hours. Keep sparks, open flame or lit cigarettes away from a battery under charge or in a room where one has been recently charged. A common cause of battery explosions is the disconnection of a live circuit at a battery terminal since a spark usually occurs under these conditions. To avoid this, be sure that the power switch is off before making or breaking connections. Poor connections are also a common cause of electrical arcs which cause explosions.

Motorcycle batteries are not designed for high charge or discharge rates. For this reason, it is recommended that a motorcycle battery be charged at a rate not exceeding 10% of its ampere-hour capacity.

For example, do not exceed 0.5 ampere charging rate for a 5 ampere-hour battery or 1.5 amperes for a 15 ampere-hour battery.

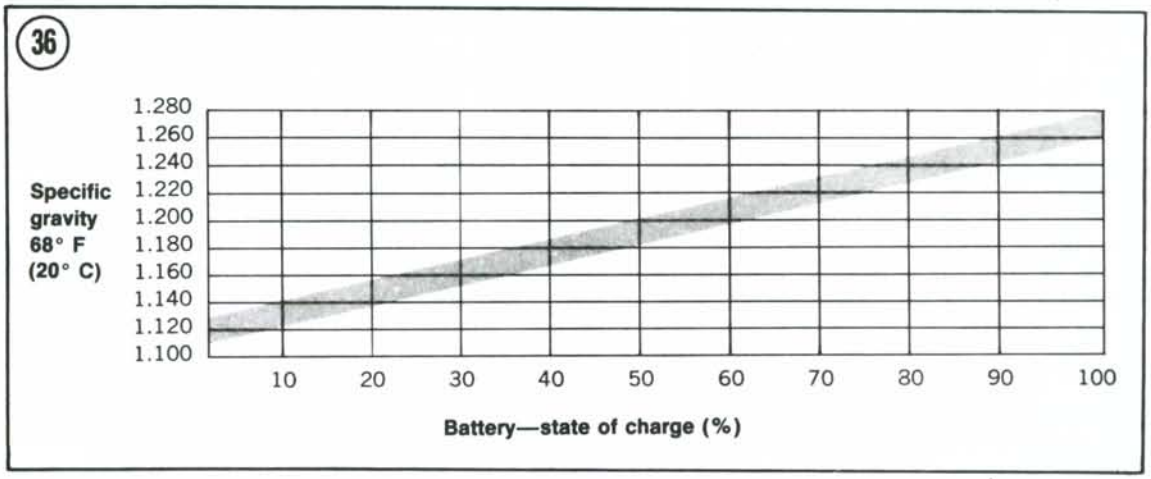
This charge rate should continue for 10 hours if the battery is completely discharged or until specific gravity of each cell is up to 1.260-1.280, corrected for temperature. If after prolonged charging, specific gravity of one or more cells does not come up to at least 1.230, the battery will not perform as well as it should but it may continue to provide satisfactory service for a time.

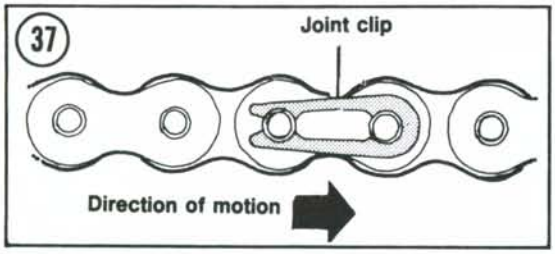


Some temperature rise is normal as a battery is being charged. Do not allow electrolyte temperature to exceed 110° F. Should temperature reach that figure, discontinue charging until the battery cools, then resume charging at a lower rate.

Testing State of Charge

Place the tube of a hydrometer into the filler opening and draw in just enough





electrolyte to lift the float (**Figure 35**). Hold the instrument in a vertical position and read specific gravity on the scale where the float stem emerges from the electrolyte.

Specific gravity of the electrolyte varies with temperature, so it is necessary to apply a temperature correction to the reading so obtained. For each 10° that battery temperature exceeds 80° F, add 0.004 to the indicated specific gravity. Likewise, subtract 0.004 from the indicated value for each 10° that battery temperature is below 80° F. Repeat this measurement for each battery cell. If there is more than 0.050 difference between cells, battery condition is questionable.

Use **Figure 36** to determine state of charge.

Don't measure specific gravity immediately after adding water. Ride the machine a few miles to ensure mixture of the electrolyte.

It is most important to maintain batteries fully charged during cold weather. A fully charged battery freezes at a much lower temperature than one which is partially discharged. Freezing temperature depends on specific gravity. Refer to **Table 4**.

Battery Cables

Keep battery cables tight and clean (free of corrosion, grease, etc.) If the cables are corroded, disconnect them and clean them separately with a wire brush and a baking soda and water solution. After cleaning, apply a thin coating of petroleum jelly to the battery terminals before installing the cables. After connecting the cables, apply a light coating to the connection. This procedure will help to prevent future corrosion.

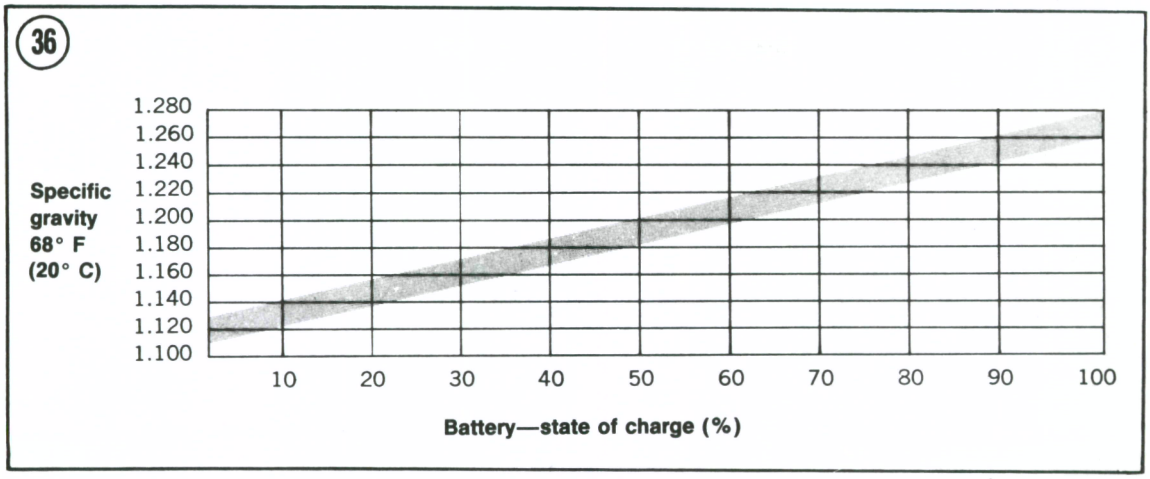
DRIVE CHAIN

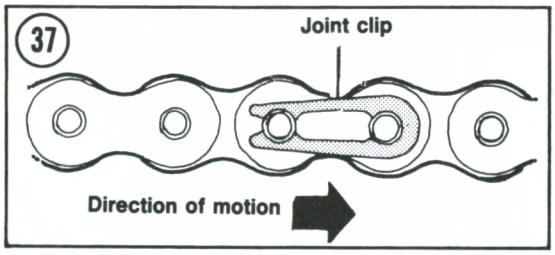
Clean, lubricate and adjust the drive chain every 1,000 miles (1,500 kilometers) or whenever necessary. The drive chain becomes worn after prolonged use. Wear in pins, bushings and rollers causes chain stretch. Sliding action between roller surfaces and sprocket teeth also contribute to wear.

Cleaning and Adjustment

1. Disconnect the master link (**Figure 37**) and remove chain.
2. Clean chain thoroughly with solvent.
3. Rinse chain with clean solvent, then blow dry with compressed air.
4. Examine chain carefully for wear or damage. Replace if there is any doubt as to its condition. If chain is okay, lubricate by soaking in oil or any of the special chain lubricants available in any motorcycle shop.
5. Install the chain. Be sure master link is installed as shown in **Figure 37**.

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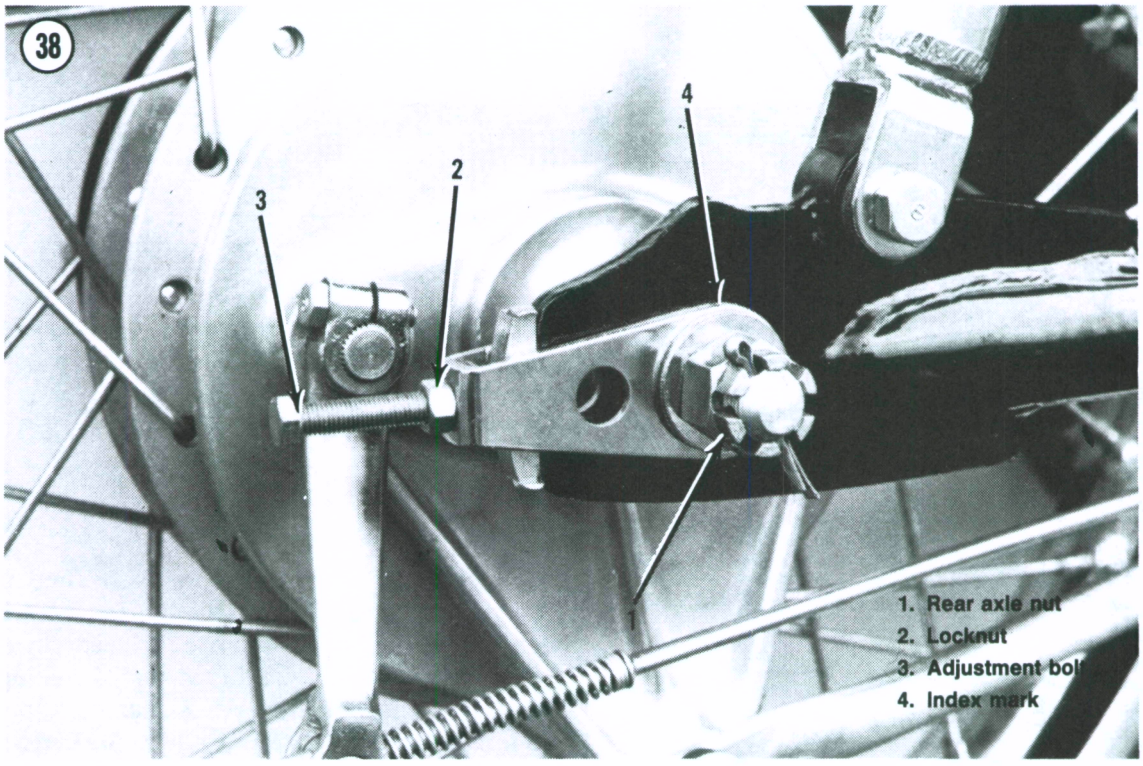
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6. Refer to **Figure 38**. Proceed with chain adjustment as follows:
   a. Remove cotter pin and loosen rear axle nut.
   b. Loosen locknut on each side.
   c. There is one adjustment bolt on each side. Turn it until there is 3/4-1 in. (20-25 mm) of up and down movement in the center of the lower chain run (**Figure 39**).
   d. Be sure that the reference marks on the swinging arm and the index mark on the chain adjuster (refer to 4, **Figure 38**) are in the same relative positions on each side.
7. Tighten the rear axle nut then install a new cotter pin (refer to 1, **Figure 38**).
8. Adjust the rear brake (refer to *Brakes* in this chapter).

FORK OIL

Replacement

Replace the fork oil every 3,000 miles (4,500 kilometers) or whenever it becomes contaminated.

1. Place a drain pan under the fork leg and remove the drain plug at the lower end of the fork leg (**Figure 40**). Allow the oil to drain for at least 5 minutes.

CAUTION

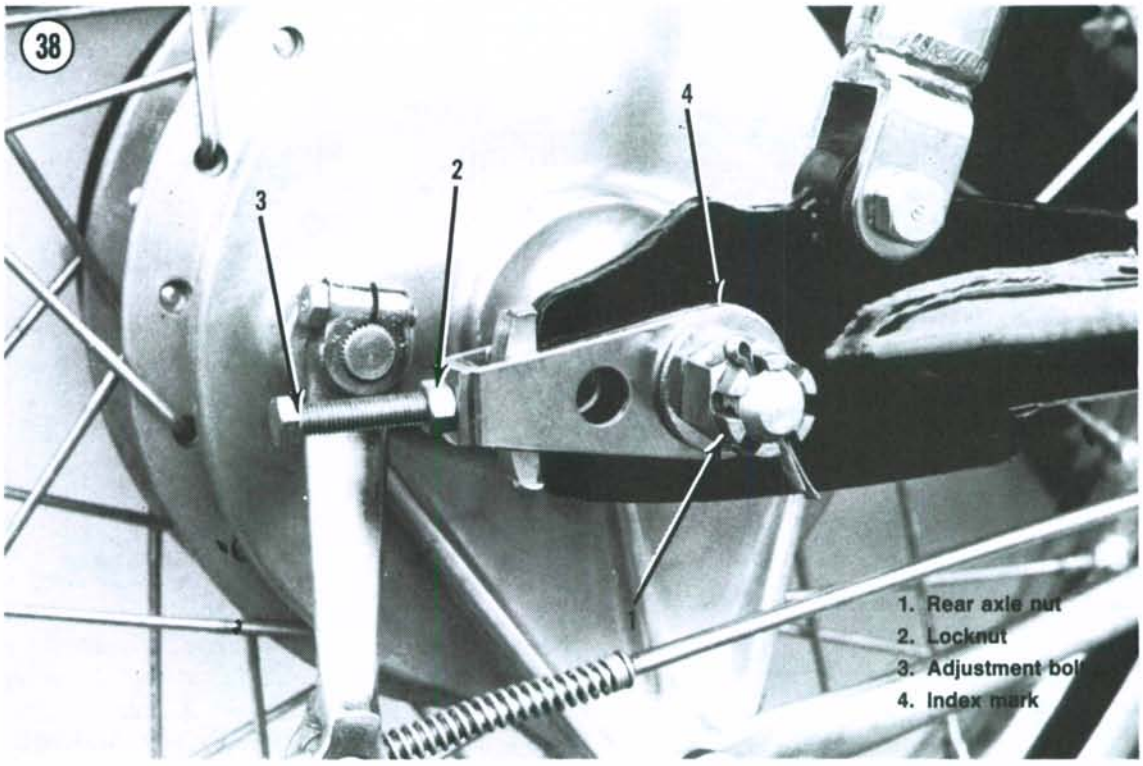
Do not allow the fork oil to come in contact with any of the brake components.

2. With both of the bike's wheels on the ground and the front brake applied, push down on the handlebars to work the forks up and down. Continue until all fork oil is expelled.
3. Install the drain screw.
4. Repeat for the other fork leg.
5. Remove the upper fork bolts (**Figure 41**). On all models, fill each fork leg with 4.6-4.7 oz. (135-140 cc) DEXRON automatic transmission fluid.
6. Install the upper fork bolts.

OIL AND OIL FILTER

Probably the single most important maintenance item which contributes to long

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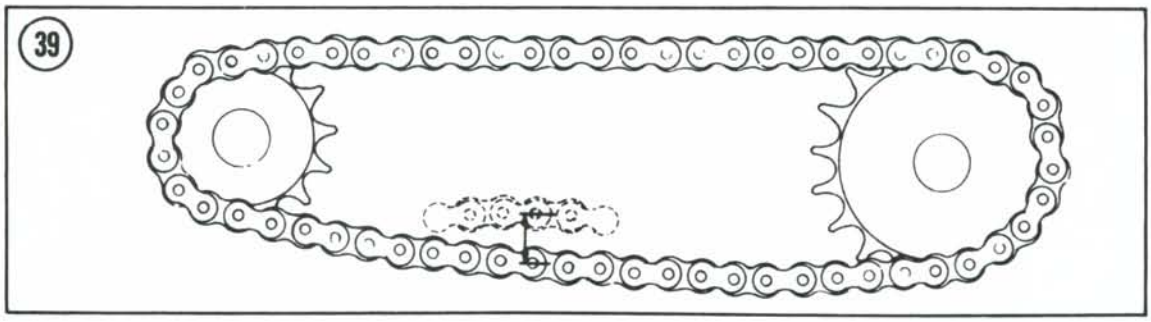
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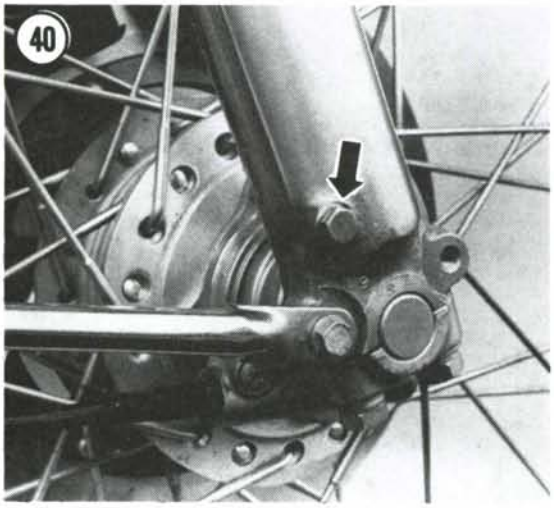
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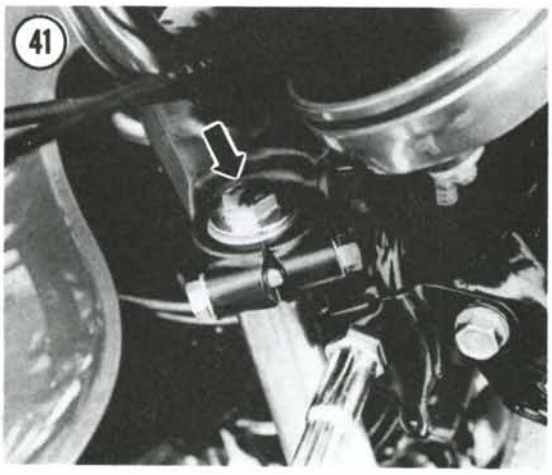
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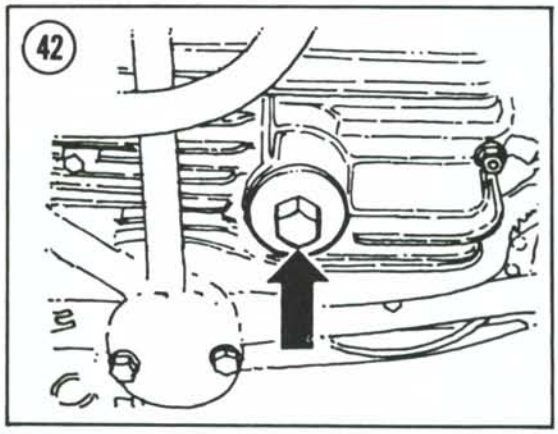
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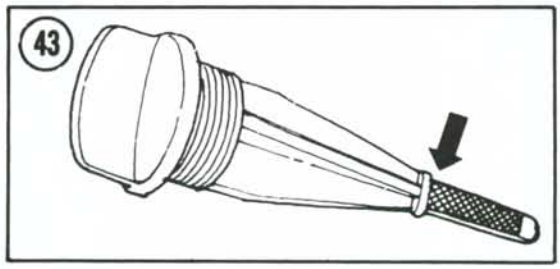






engine life is that of regular oil changes. Engine oil becomes contaminated with products of combustion, condensation and dirt. Some of these contaminants react with oil, forming acids which attack vital engine components and thereby result in premature wear.





Engine Oil Change

To change engine oil, ride the bike until it is thoroughly warm then place a pan under the engine and remove the engine oil drain plug (**Figure 42**). Allow the oil to drain thoroughly; it may help to rock the motorcycle from side to side and also forward and backward to get as much oil out as possible.

Install the engine oil drain plug and refill with fresh engine oil Refer to **Table 5** for recommended grades. Capacity is 3.2 U.S. pints (1.5 liters).

Be sure to check for leaks after the oil change is complete.

Maintain the engine oil level between both level marks on the dipstick (**Figure 43**).

NOTE
The dipstick should not be screwed into the engine when checking oil level.

Centrifugal Oil Filter Cleaning

The centrifugal oil filter separates sludge and other foreign matter from the engine oil before the oil enters the engine.

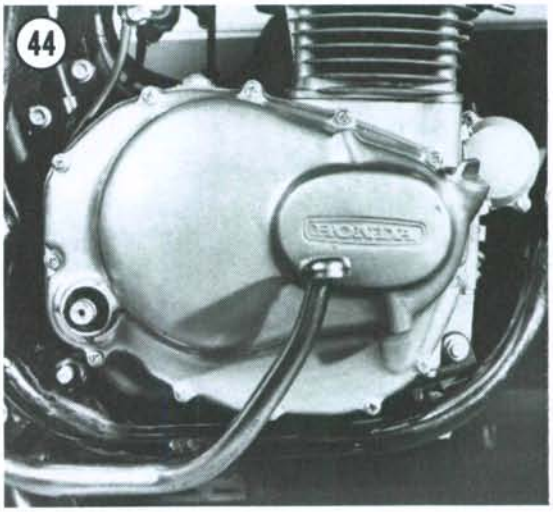
1. Remove the footrests, right-hand muffler and the kickstarter lever.
2. Remove the right-hand crankcase cover (**Figure 44**) and gasket.
3. Remove the internal circlip securing the oil filter cap (**Figure 45**).
4. Remove the oil filter cap (**Figure 46**).
5. Clean the filter cap and rotor in solvent and thoroughly dry.
6. Install a new O-ring seal on the filter cap.
7. Align one of the ribs on the filter cap with the index mark on top of the rotor. Install the filter cap and the circlip.
8. Make sure the locating dowels are in place and install a new gasket and the right-hand crankcase cover.
9. Refill the engine with the correct type and quantity of engine oil.

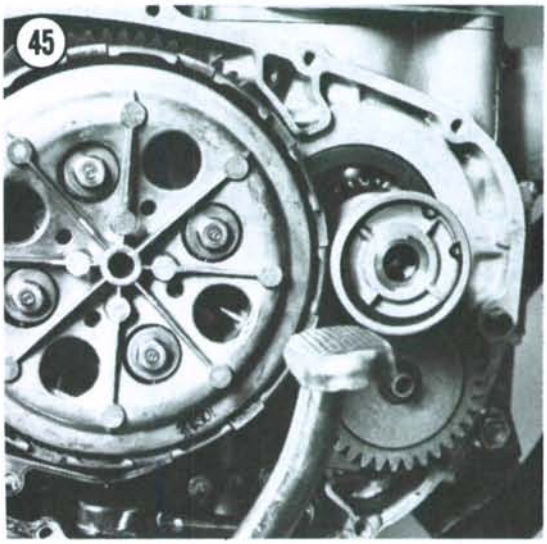
SWING ARM

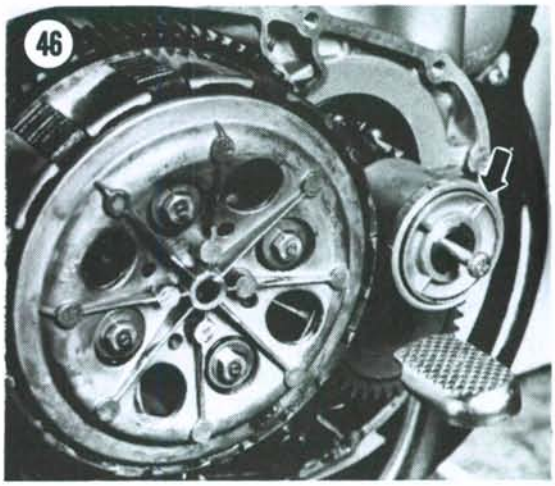
Remove, disassemble and grease the swing arm every 6,000 miles (9,000 kilometers).

Refer to **Figure 47** for this procedure.

1. Remove the rear wheel as described in Chapter Seven.
2. Remove the mufflers on both sides.
3. Remove the shock absorber lower mounting bolts on each side. Pivot the shock absorbers up and out of the way.
4. Remove the drive chain guard.
5. Remove the pivot bolt nut and washer on the left-hand side.
6. Remove the pivot bolt from the right-hand side and remove the swing arm from the frame.
7. Remove the dust caps from each side and withdraw the pivot collar from the swing arm.
8. Thoroughly clean the pivot collar and the bushings on each side of the swing arm with solvent. Dry with compressed air.
9. Apply a coat of multipurpose grease to the pivot collar and to the pivot bushings.
10. Assemble and install by reversing Steps 1-7.







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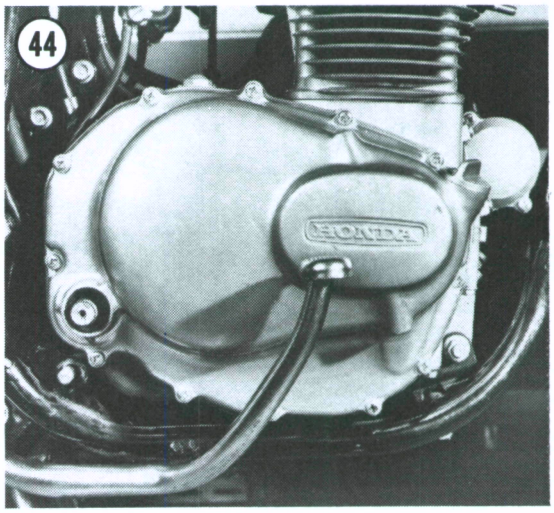
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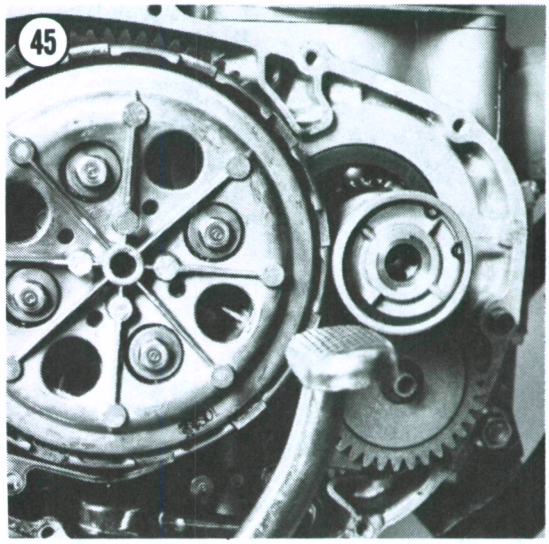
SWING ARM

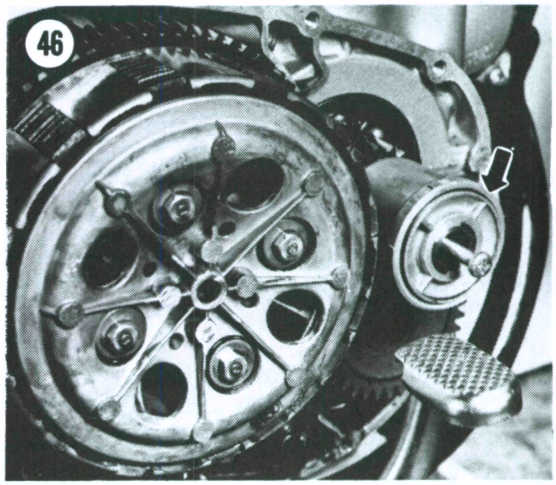
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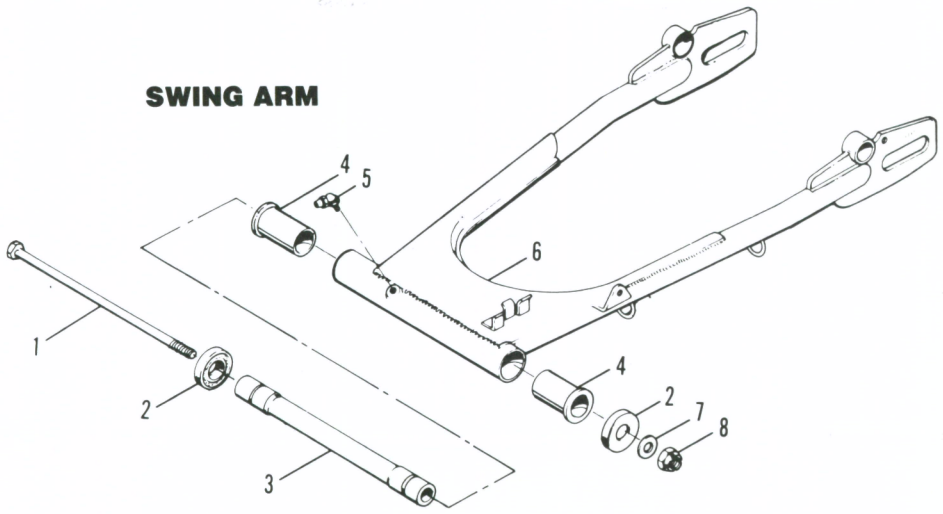






47

SWING ARM



1. Pivot bolt
2. Dust seal
3. Pivot collar
4. Bushing
5. Grease fitting
6. Swing arm assembly
7. Washer
8. Hex nut

48



CONTROL CABLES

Every 4,000 miles (6,400 kilometers) the control cables should be lubricated. They also should be inspected at this time for fraying and the cable sheath should be checked for chafing. The cables are relatively inexpensive and should be replaced when found to be faulty.

The control cables can be lubricated either with oil or with any of the popular cable lubricants and a cable lubricator. The first method requires more time and the complete lubrication of the entire cable is less certain.

Examine the exposed end of the inner cable. If it is dirty or the cable feels gritty when moved up and down in its housing, first spray it with a lubricant/solvent such as LPS-25 or WD-40. Let this solvent drain out, then proceed with the following steps.

Oil method

1. Disconnect the cables from the front brake lever (drum brake models), the clutch lever and the throttle grip assembly.

NOTE

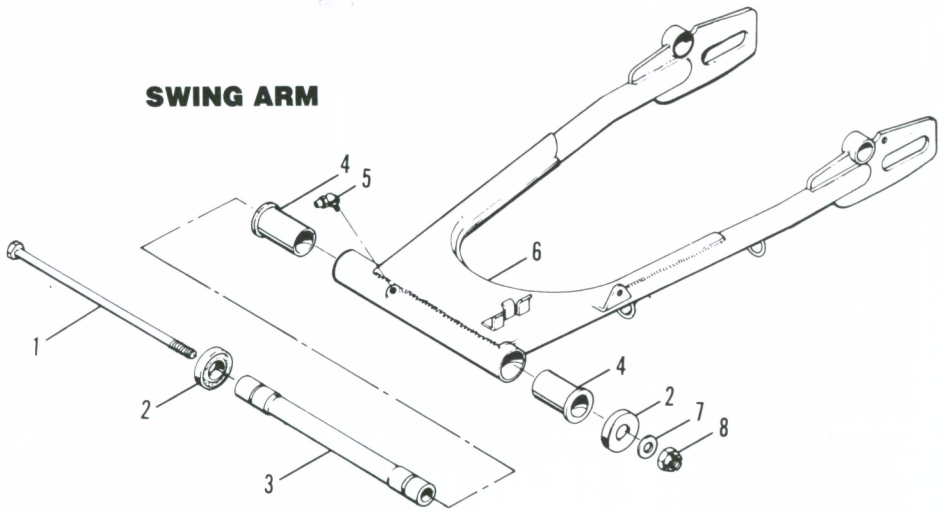
On the throttle cable it is necessary to remove the screws that clamp the housing together to gain access to the cable end.

2. Make a cone of stiff paper and tape it to the end of the cable sheath (**Figure 48**).
3. Hold the cable upright and pour a small amount of light oil (SAE 10W-30) into the cone. Work the cable in and out of the sheath

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2. Make a cone of stiff paper and tape it to the end of the cable sheath (**Figure 48**).
3. Hold the cable upright and pour a small amount of light oil (SAE 10W-30) into the cone. Work the cable in and out of the sheath

for several minutes to help the oil work its way down to the end of the cable.

NOTE

To avoid a mess, place a shop cloth at the end of the cable to catch the oil as it runs out.

4. Remove the cone, reconnect the cable and adjust the cable(s) as described in this chapter.

Lubricator method

1. Disconnect the cables from the front brake lever (drum brake models), the clutch lever and the throttle grip assembly.

NOTE

On the throttle cable it is necessary to remove the screws that clamp the housing together to gain access to the cable end.

2. Attach a lubricator following the manufacturer's instructions.
3. Insert the nozzle of the lubricant can in the lubricator, press the button on the can and hold it down until the lubricant begins to flow out of the other end of the cable.

NOTE

Place a shop cloth at the end of the cable(s) to catch all excess lubricant that will flow out.

4. Remove the lubricator, reconnect the cable(s) and adjust the cable(s) as described in this chapter.

Table 3 TIRE INFLATION PRESSURE

Tire size	Inflation pressure psi	Inflation pressure kg/cm^2
3.00 x 18-4PR	26	1.8
3.50 x 18-4PR	28	2.0
3.00S x 18-4PR	25	1.75
3.50S x 18-4PR	28	2.0

Table 5 OIL GRADES

Temperature Range	Oil Grade
Below 32 degrees F	10W
32 to 60 degrees F	20W
Above 60 degrees F	30W

Table 4 SPECIFIC GRAVITY/FREEZING TEMPERATURE

Specific Gravity	Freezing Temperature Degrees F
1.100	18
1.120	13
1.140	8
1.160	1
1.180	−6
1.200	−17
1.220	−31
1.240	−50
1.260	−75
1.280	−92

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CHAPTER FOUR

ENGINE, TRANSMISSION AND CLUTCH

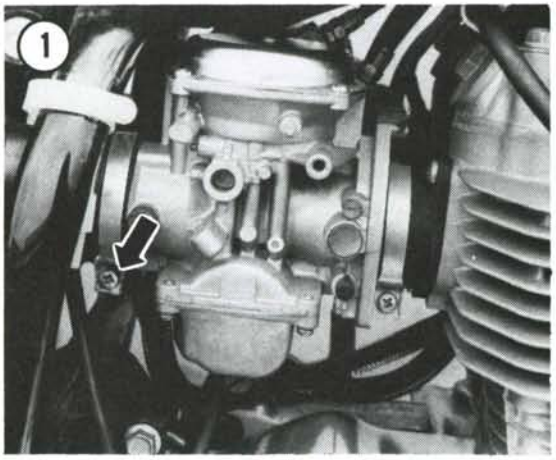
This chapter describes removal, disassembly, service, reassembly and installation of the engine, transmission and clutch. Engine removal is not necessary for service operations on alternators, oil pumps, clutches or shifter mechanism.

Tables 1-10 are at the end of this chapter.

SERVICE HINTS

Experience has shown that work goes faster and easier if certain standard shop practices are observed. Some of the more important ones are listed below.

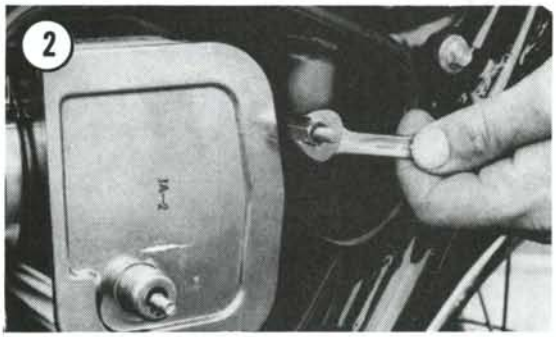
1. During engine disassembly, keep all related parts together. Reassembly will be much easier if this precaution is taken, especially if a long period lapses between disassembly and reassembly.
2. All O-rings, gaskets, snap rings and cotter pins which are removed should be replaced.
3. Be sure all parts are clean upon reassembly.
4. Lubricate all moving parts liberally before reassembly.
5. On parts attached with multiple bolts or screws, tighten those of larger diameter first. If parts are attached with inner and outer bolts or screws, tighten inner ones first.

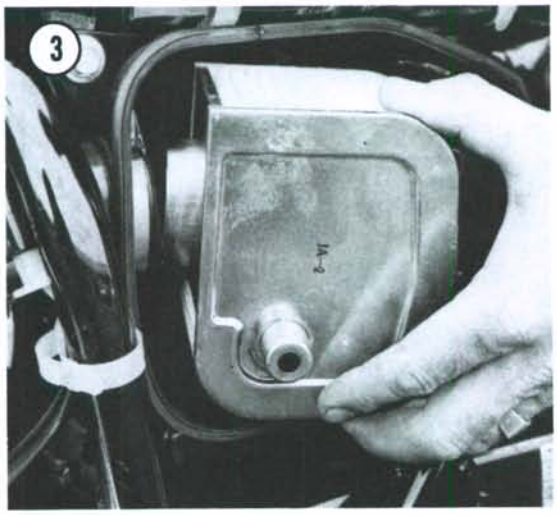


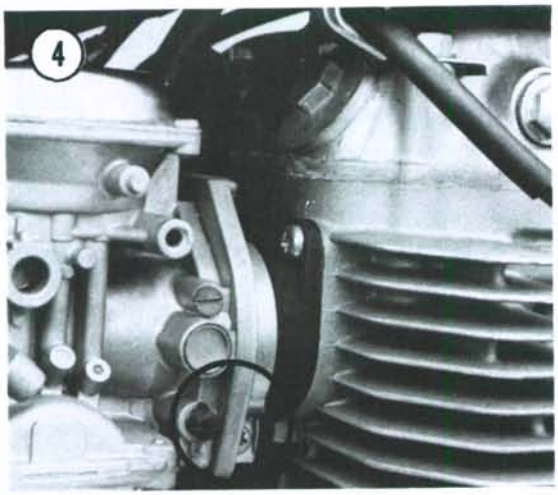
PRELIMINARY ENGINE DISASSEMBLY

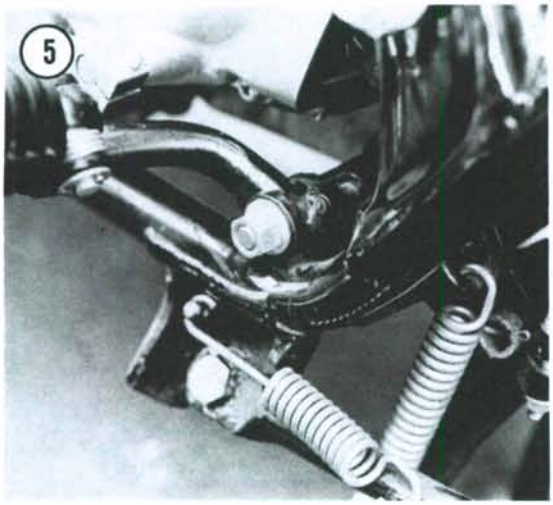
It is quite often easier to dismantle the engine as far as possible while it is still mounted in the frame. Proceed as follows:

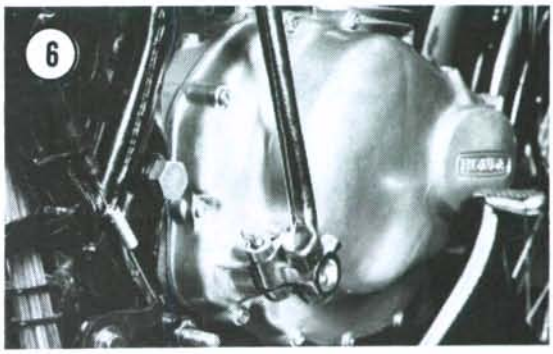
1. Loosen air filter clamp screw (**Figure 1**), then remove 2 bolts holding air filter in place and remove air filter (**Figure 2** and **Figure 3**).

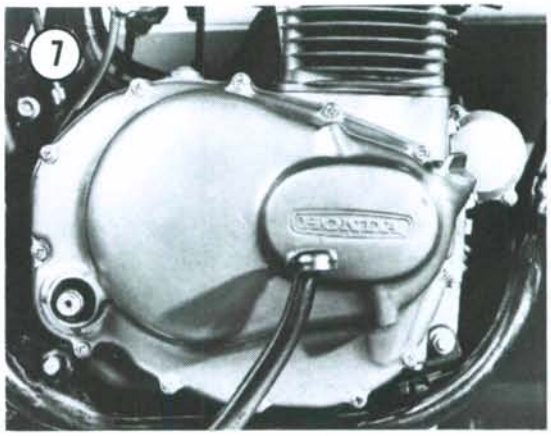


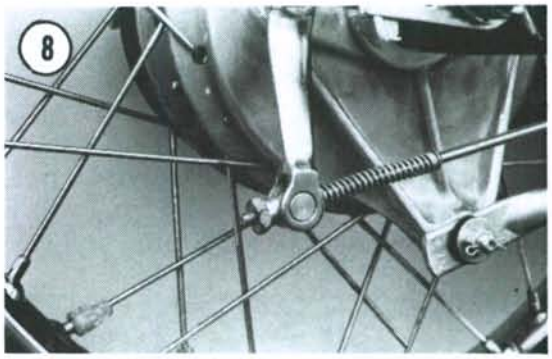

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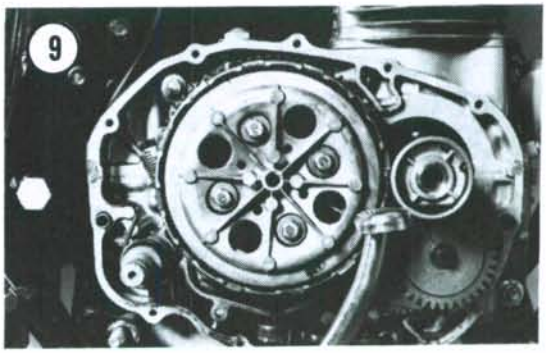

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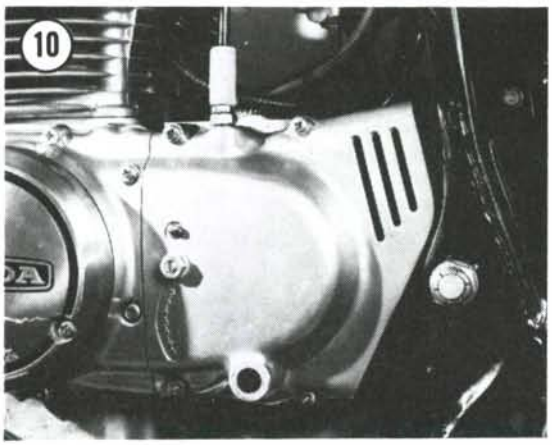

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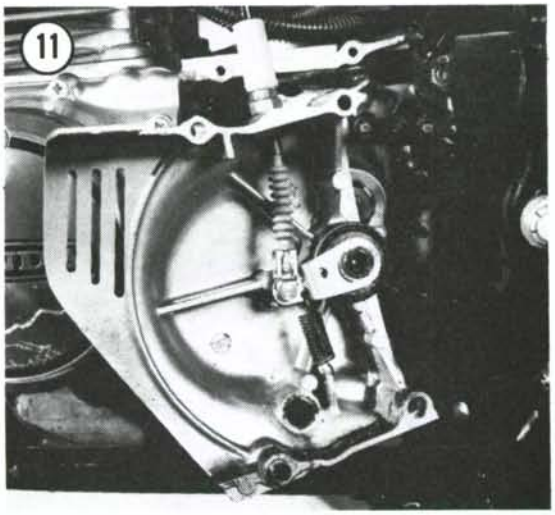

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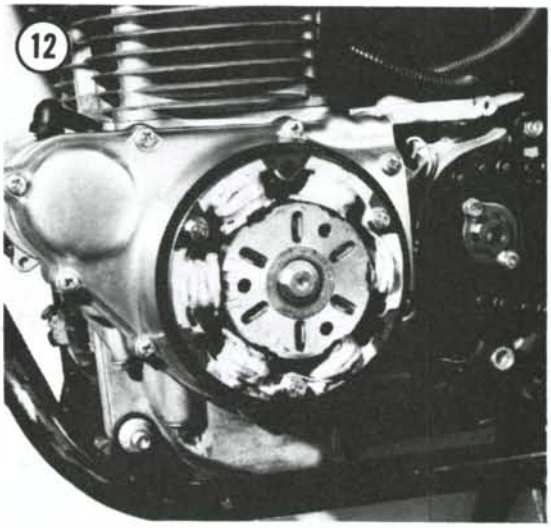
2. Disconnect the push-pull throttle cables from the twist grip and loosen all routing clamps. Remove the carburetor clamp screws (**Figure 4**) and remove the carburetors from the cylinder head.
3. Remove the footrests (**Figure 5**).
4. Remove the kickstarter (**Figure 6**).
5. Remove the right-hand crankcase cover and gasket (**Figure 7**).
6. Slacken brake adjusting nut (**Figure 8**).
7. Tap the case with a rubber or plastic mallet to loosen it, then lift case off (**Figure 9**).

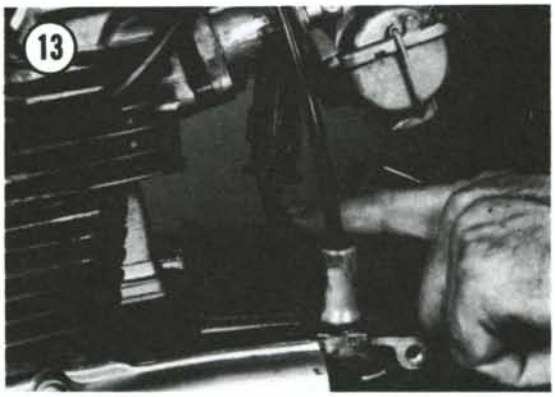
NOTE

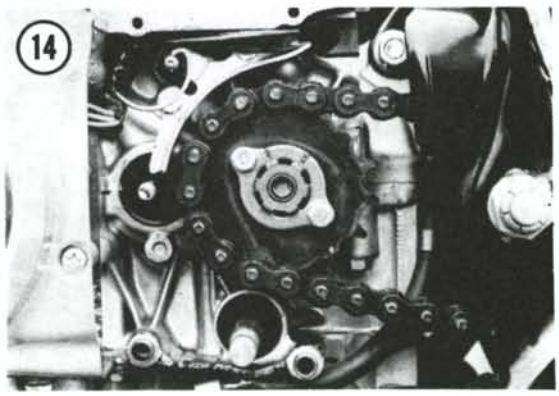
Be sure thrust washer remains on shaft. It can be found inside the case if it is missing.



8. On opposite side of engine, remove cover (**Figure 10**).
9. Disconnect clutch cable (**Figure 11**).
10. Remove alternator cover (**Figure 12**).
11. Disconnect electrical plug (**Figure 13**).
12. Disconnect neutral light switch wire (**Figure 14**).







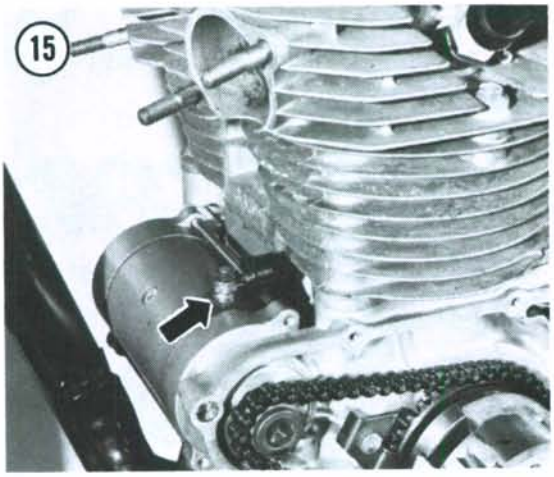
13. Remove alternator housing (3 long and 5 short bolts), then tap the cover with a rubber or plastic mallet to loosen it; remove it.
14. Disconnect starter cable (**Figure 15**).
15. Remove starter bolts (**Figure 16**), then remove starter, sprocket and chain (**Figure 17**).
16. Remove sprocket bolts and sprocket (**Figure 18**).
17. Remove starter cable retaining clips (**Figure 19**).
18. Disconnect the breaker point wire.
19. Remove spark plug wires.
20. Unhook wiring harness from frame clips.
21. Remove screw holding tachometer cable and pull cable out of housing.
22. Check engine for any electrical connections, etc. that you may have missed and disconnect them.

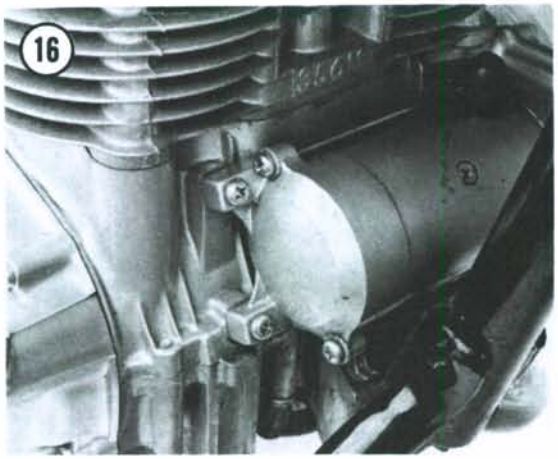
CLUTCH AND EXTERNAL SHIFT MECHANISM

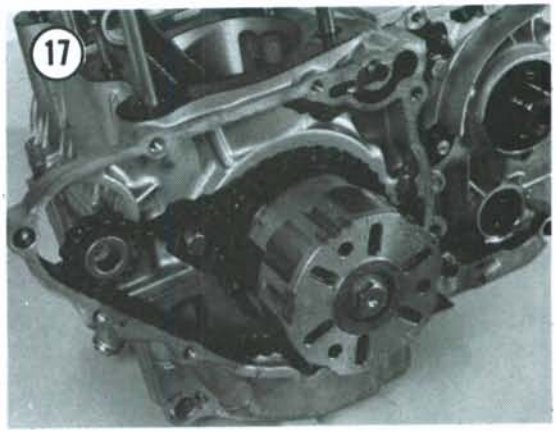
On all models, the clutch is located under the right crankcase cover and may be serviced without engine removal.

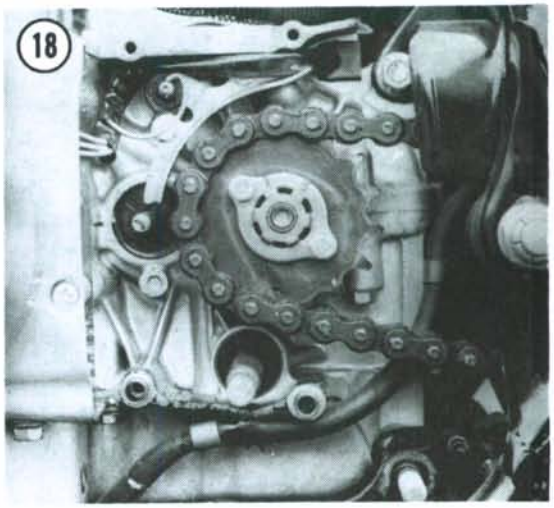
Removal

1. Remove snap ring holding the oil filter cap in place then remove the oil filter cap (**Figure 20** and **Figure 21**).
2. Bend the locking tab back, then remove the locknut with Honda tool part no. 07916-2830000. Remove the locknut, lockwasher and dished washer which is marked "OUTSIDE" for reassembly purposes. Refer to **Figure 22**.
3. Remove the oil filter housing (**Figure 23**).
4. Remove the oil pump drive gear (**Figure 24**).









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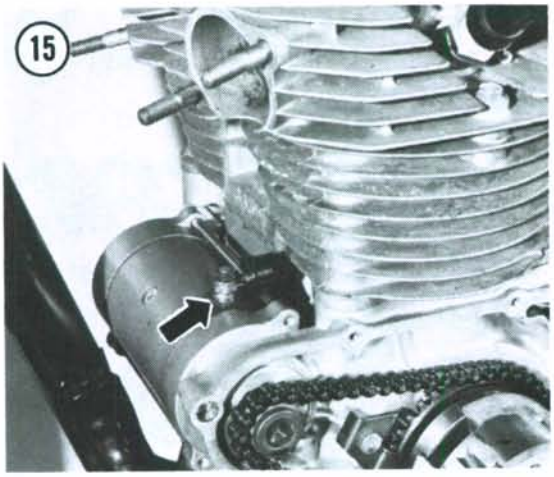
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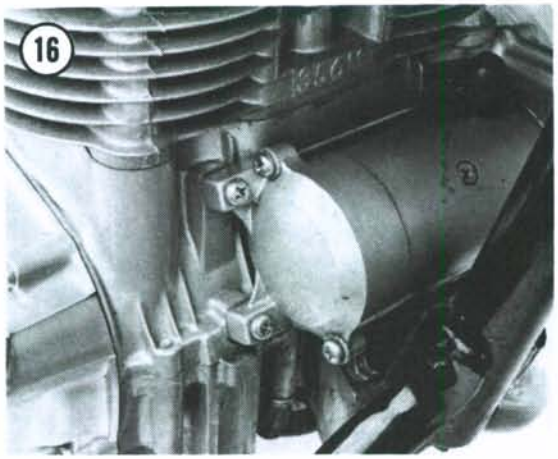
CLUTCH AND EXTERNAL SHIFT MECHANISM

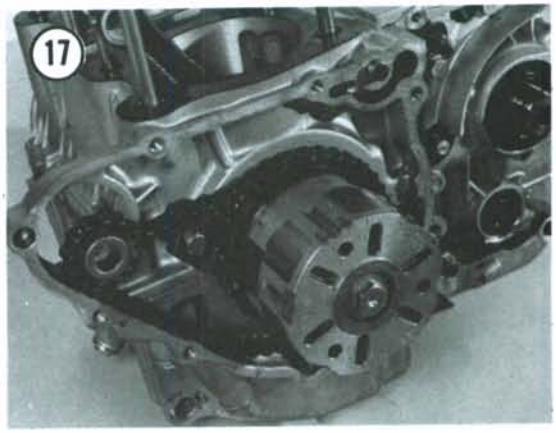
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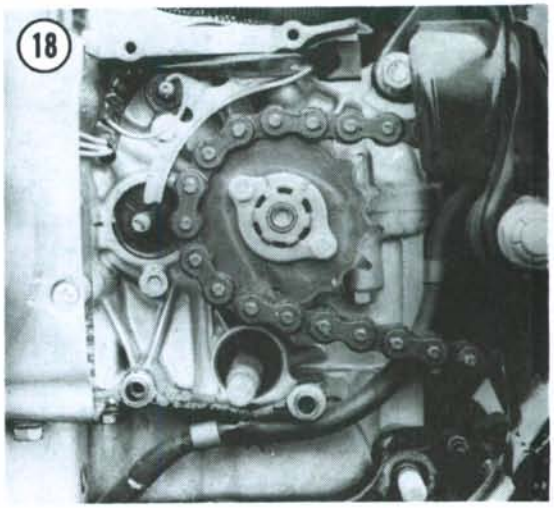
Removal

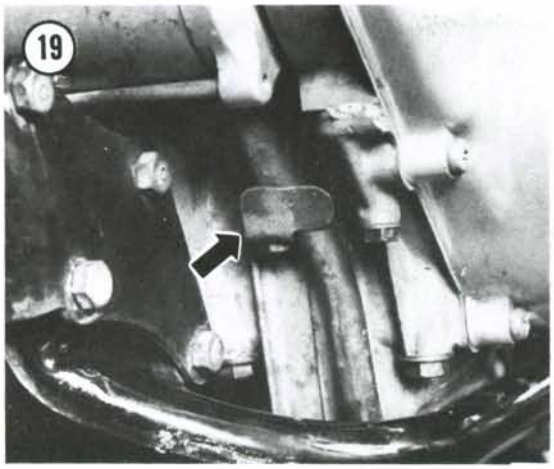
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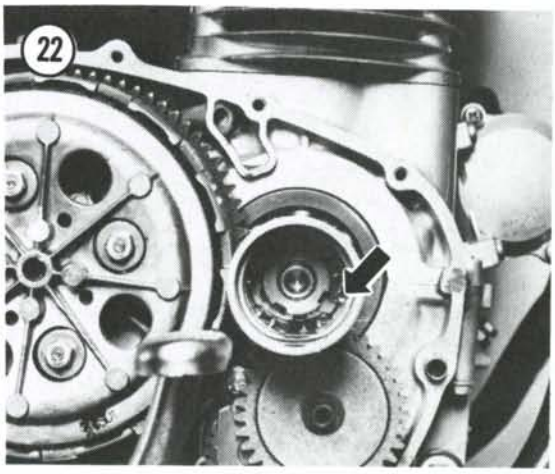


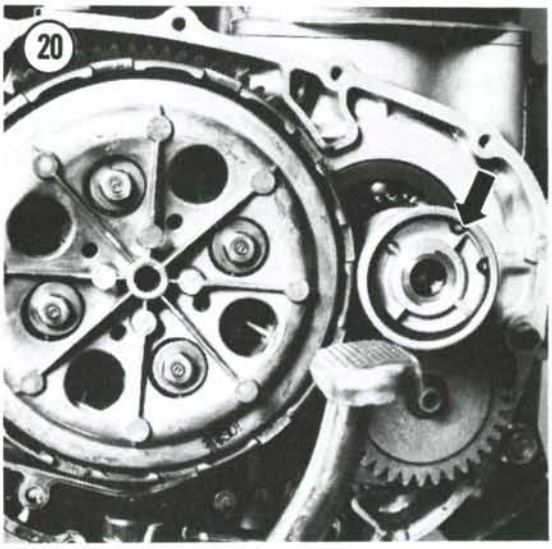


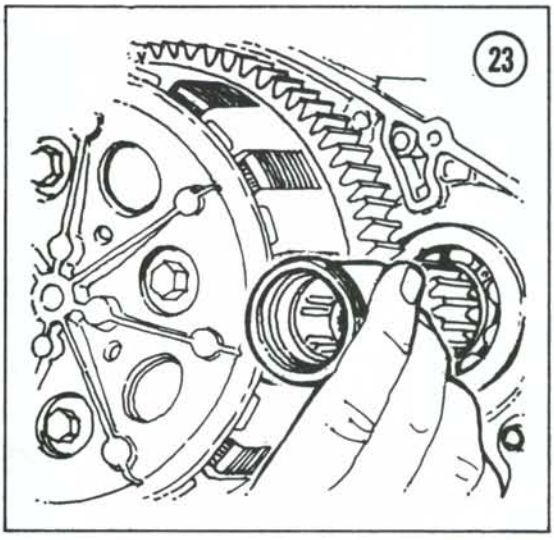


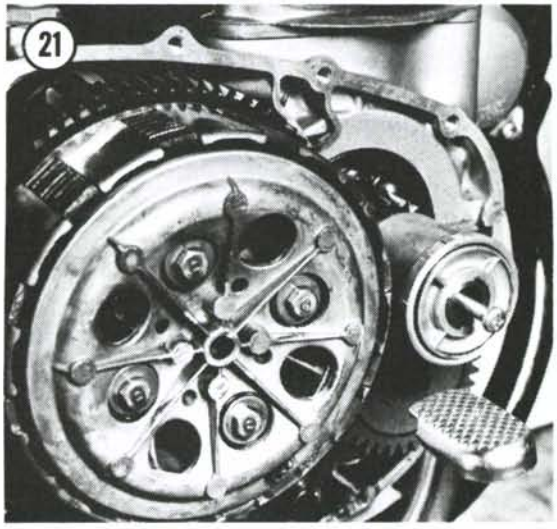


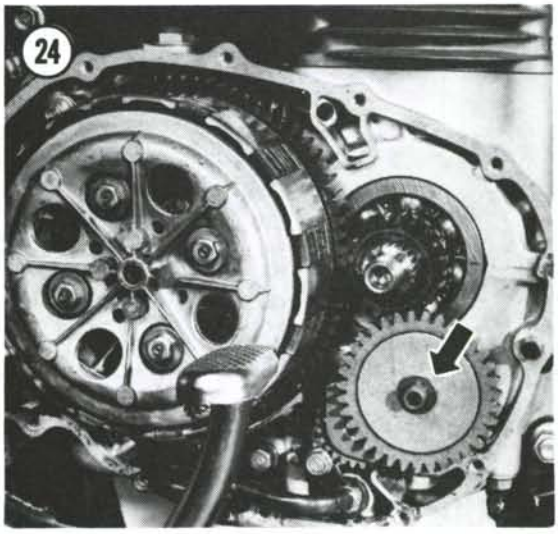

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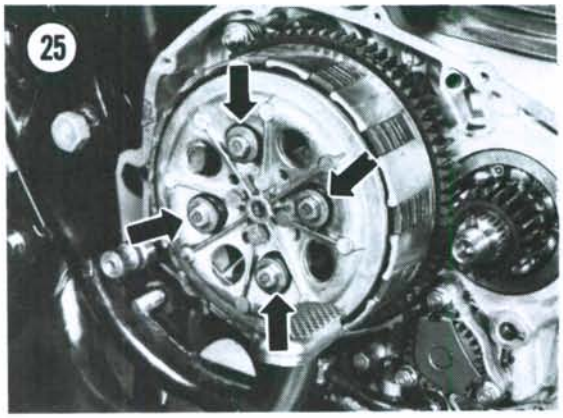

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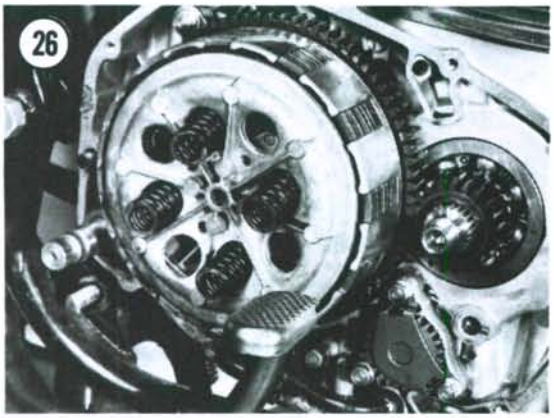
5. Remove hex bolts that hold clutch springs (**Figure 25**) and remove the clutch springs. See **Figure 26**.

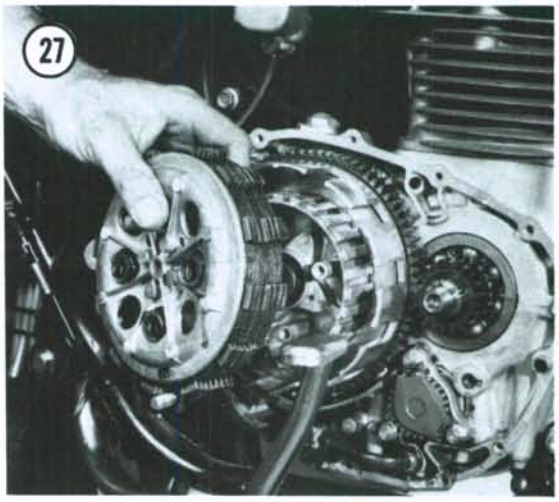
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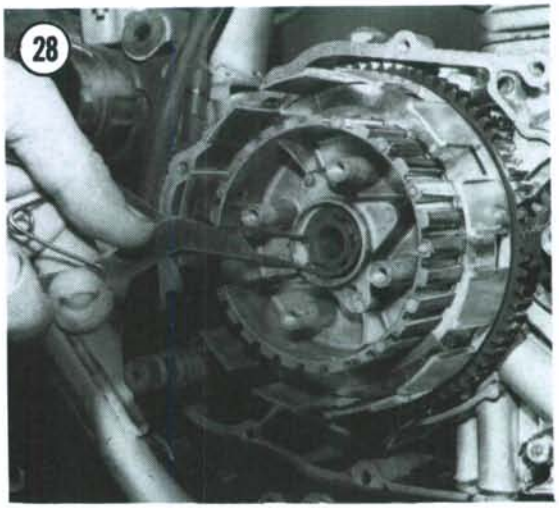
Loosen each hex bolt a little bit at a time to equalize pressure.

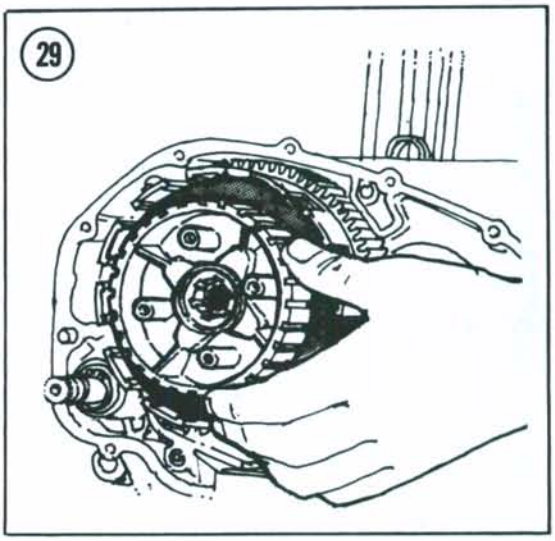
6. Remove clutch pressure plate and all friction and steel plates as a unit (**Figure 27**).
7. Remove the push crown then the clutch hub snap ring (**Figure 28**).
8. Remove the clutch hub (**Figure 29**).
9. Remove the clutch housing (**Figure 30**).
10. Remove primary drive gear (**Figure 31**).
11. Remove thrust washer, snap ring and kickstarter return spring (**Figure 32**).
12. Remove shift cam stopper plate (**Figure 33**).
13. On opposite side of engine, remove shift lever then depress the shift arm from the shift drum (**Figure 34**).
14. Pull out the shift spindle (**Figure 35**).

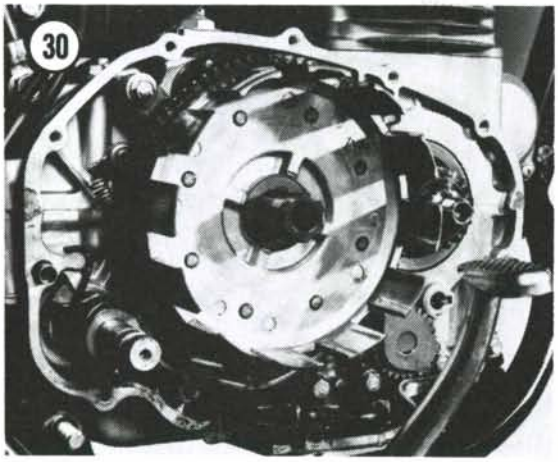


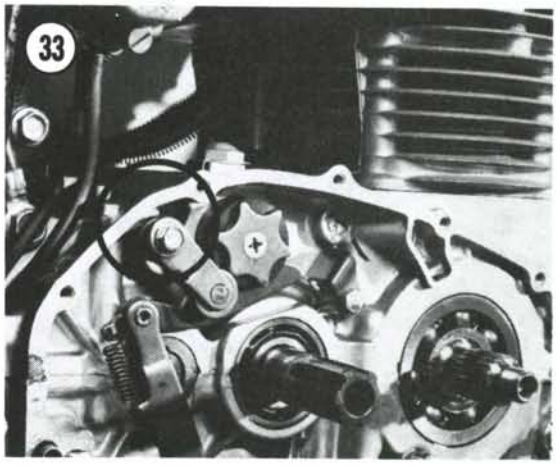


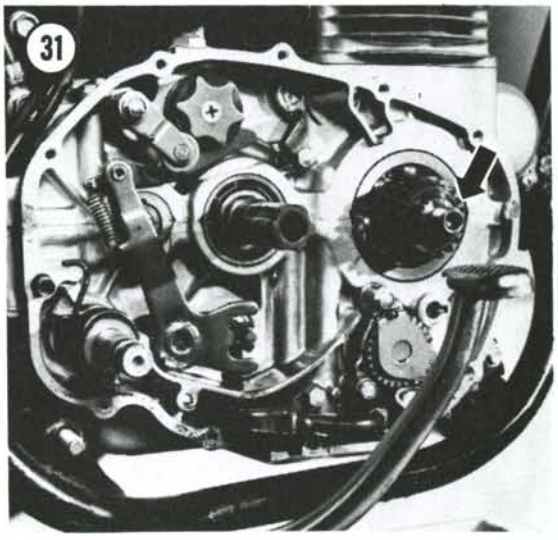


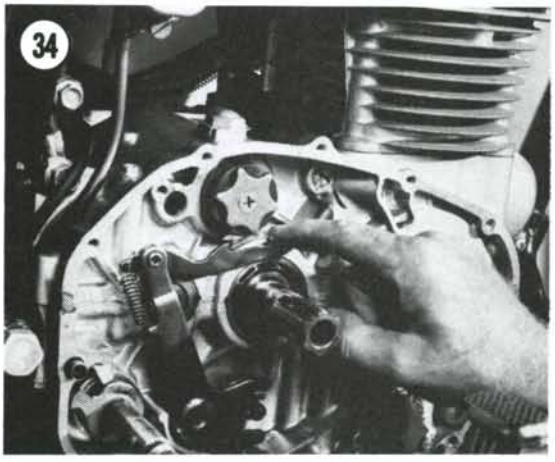


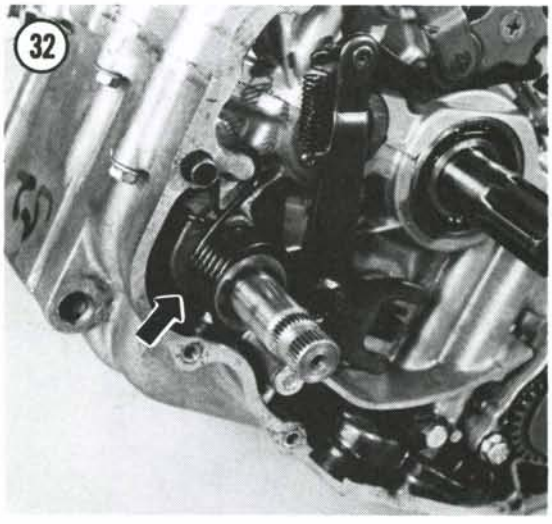



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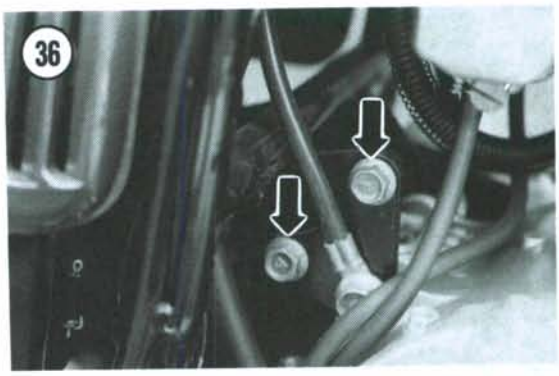

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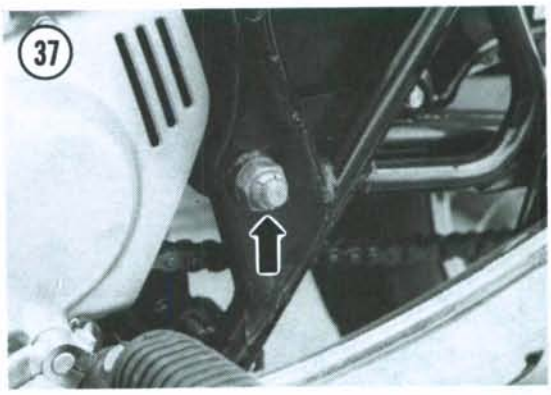
Inspection

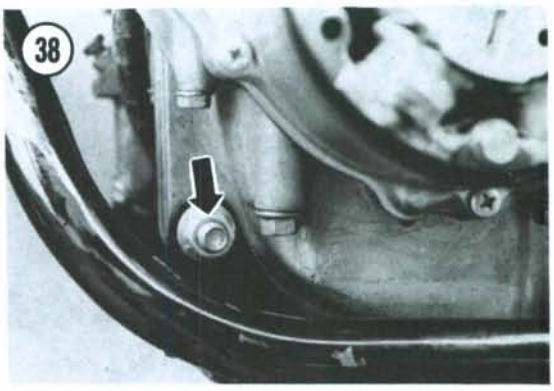
1. Measure thickness of each friction disc with vernier calipers. Replace all discs if any disc is worn to its wear limit as specified in **Table 1**.
2. Place each clutch plate on a flat surface. Using a feeler gauge, measure clutch plate warpage. Replace plates if any plate is warped more than 0.012 in. (0.3 mm).
3. Measure free length of each clutch spring. Replace all springs as a set if any spring is shorter than its service limit as specified in **Table 2**.

ENGINE REMOVAL

Engine removal is similar for all models listed in this manual.
1. Warm the engine if possible, then drain engine oil into a pan.
2. Turn fuel petcock selector lever to STOP, then remove fuel lines from fuel petcock.
3. Remove battery cable.
4. Remove gas tank.
5. Perform all steps listed under *Preliminary Engine Dismantling* in this chapter.
6. Remove top rear engine mounting bolts (**Figure 36**).
7. Remove lower rear engine mounting bolts (**Figure 37**).
8. Remove front lower engine mounting bolts (**Figure 38**).
9. Lift engine out of frame.
10. Remove alternator retaining bolt, then pull the alternator with a puller (**Figure 39** and **Figure 40**).
11. Remove the starter sprocket retaining bolt (refer to A, **Figure 40**), then pull the starter sprocket off (**Figure 41**).









CYLINDER HEAD

Removal

1. Remove the side cover retaining bolts and remove the side covers. There is one at each end of the cam base.

NOTE

It may be necessary to tap the covers loose with a rubber or plastic mallet.

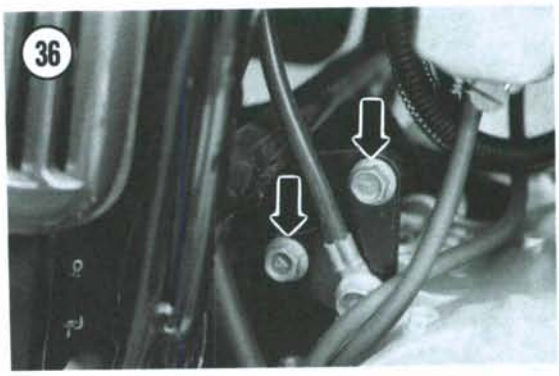
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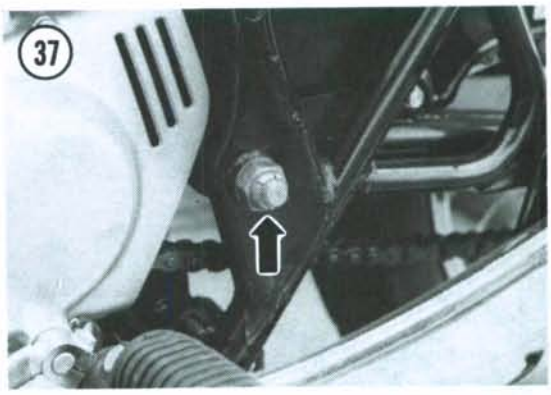
Inspection

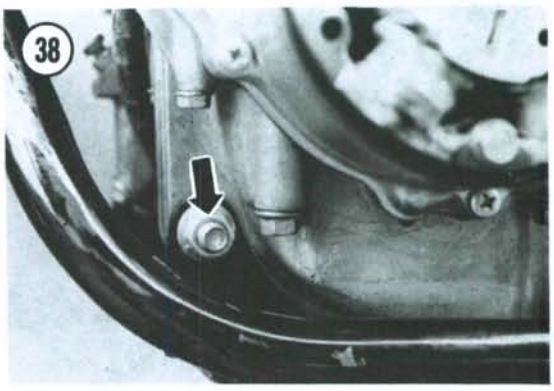
1. Measure thickness of each friction disc with vernier calipers. Replace all discs if any disc is worn to its wear limit as specified in **Table 1**.
2. Place each clutch plate on a flat surface. Using a feeler gauge, measure clutch plate warpage. Replace plates if any plate is warped more than 0.012 in. (0.3 mm).
3. Measure free length of each clutch spring. Replace all springs as a set if any spring is shorter than its service limit as specified in **Table 2**.

ENGINE REMOVAL

Engine removal is similar for all models listed in this manual.
1. Warm the engine if possible, then drain engine oil into a pan.
2. Turn fuel petcock selector lever to STOP, then remove fuel lines from fuel petcock.
3. Remove battery cable.
4. Remove gas tank.
5. Perform all steps listed under *Preliminary Engine Dismantling* in this chapter.
6. Remove top rear engine mounting bolts (**Figure 36**).
7. Remove lower rear engine mounting bolts (**Figure 37**).
8. Remove front lower engine mounting bolts (**Figure 38**).
9. Lift engine out of frame.
10. Remove alternator retaining bolt, then pull the alternator with a puller (**Figure 39** and **Figure 40**).
11. Remove the starter sprocket retaining bolt (refer to A, **Figure 40**), then pull the starter sprocket off (**Figure 41**).









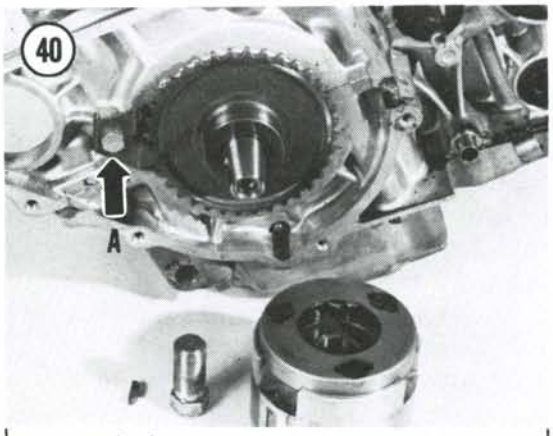
CYLINDER HEAD

Removal

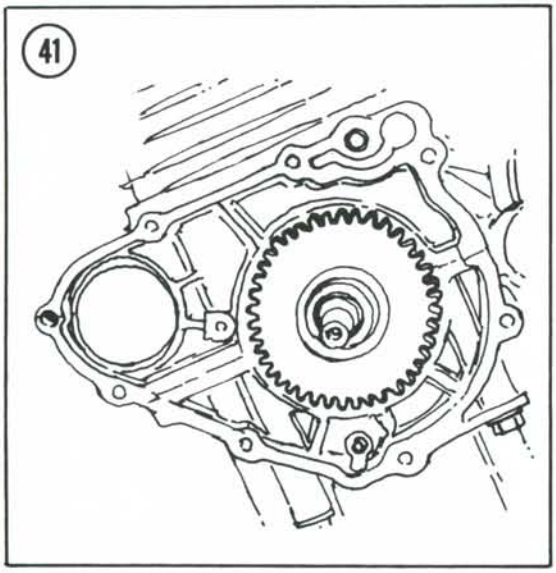
1. Remove the side cover retaining bolts and remove the side covers. There is one at each end of the cam base.

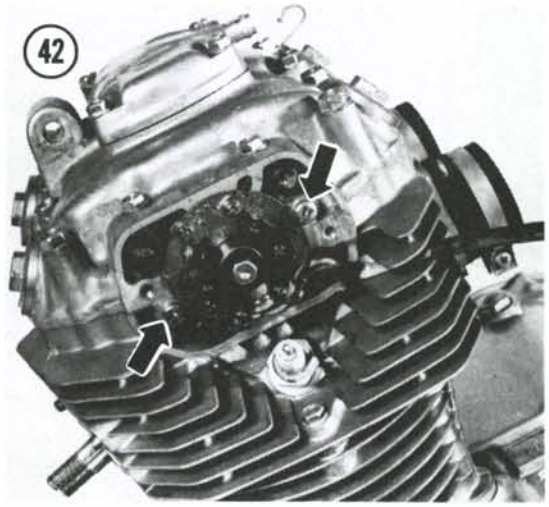
NOTE

It may be necessary to tap the covers loose with a rubber or plastic mallet.

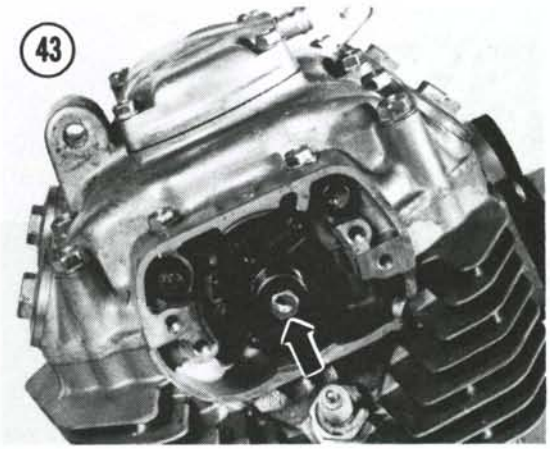


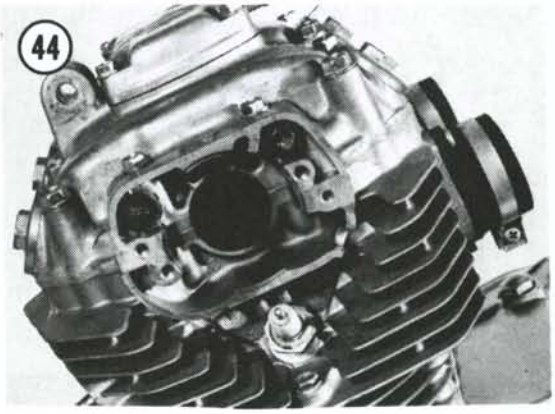
A. Starter sprocket retaining bolt

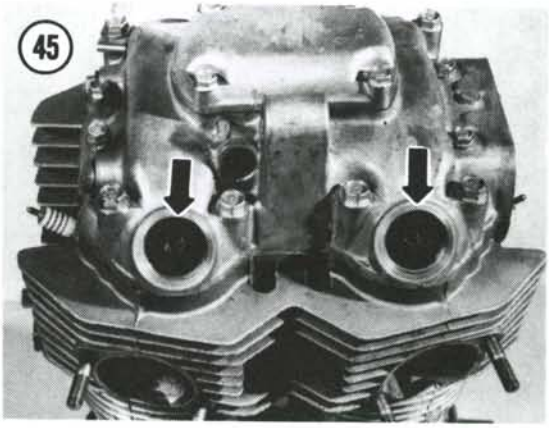




2. Remove breaker point cover. Remove the 2 screws holding the breaker plate assembly in place (**Figure 42**).
3. Remove the spark advance mechanism center bolt (**Figure 43**), then remove the spark advance mechanism (**Figure 44**).
4. Remove all tappet covers (**Figure 45**).







4

5. Remove engine breather cover and gasket (**Figure 46**).
6. Remove eight 8 mm and six 6 mm bolts, then remove cylinder head cover (**Figure 47**).

NOTE

Tap the cover with a rubber or plastic mallet to loosen it.

7. Remove the front cam chain tensioner guide (**Figure 48**).
8. Remove the retaining bolts, then lift the cam chain tensioner out (**Figure 49**).
9. Remove the camshaft sprocket retaining bolts (**Figure 50**).

NOTE

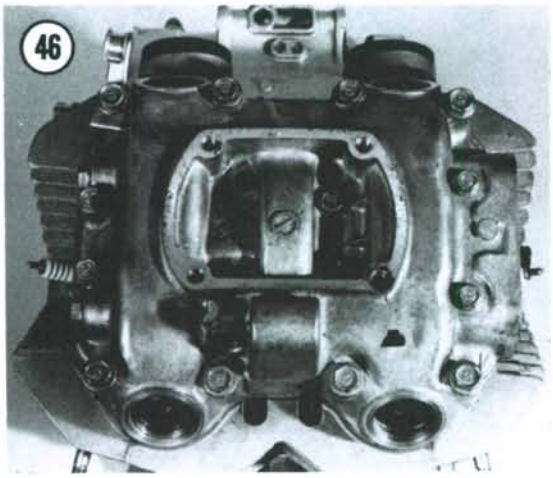
It will be necessary to rotate the crankshaft in order to get at the remaining bolt after removing the first one.

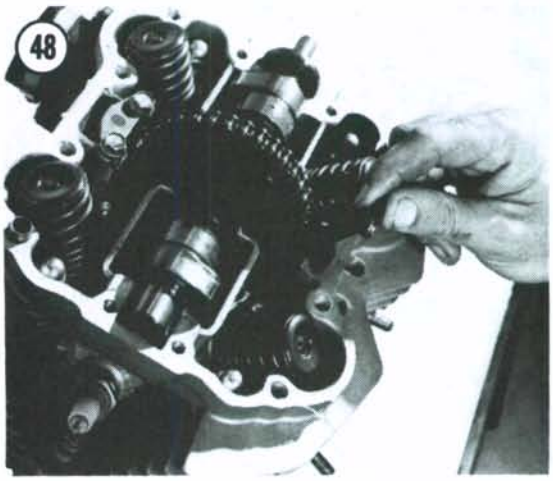
10. Slip the chain off of the sprocket as shown in **Figure 51**.
11. Slide the camshaft out to the right. Tie a piece of wire to the cam chain and wrap one end of the wire around a stud to keep the chain from dropping down into the engine (**Figure 52**).

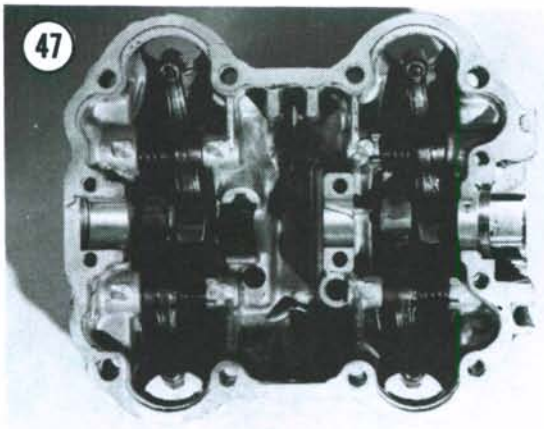
CAUTION

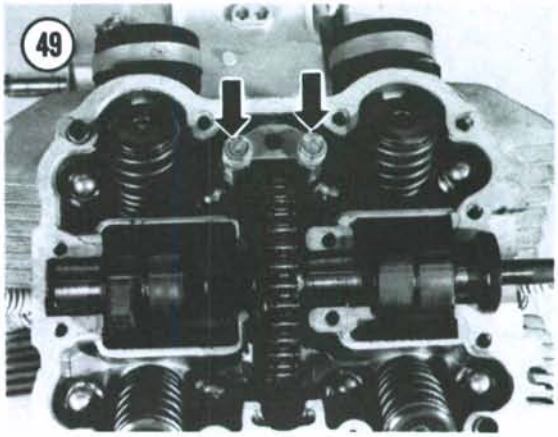
When removing the camshaft (refer to Step 11, preceding), do not lose the thrust washer on the left end of the camshaft.

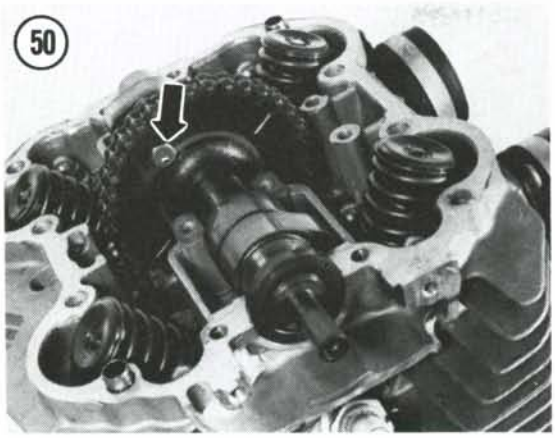
12. Remove 2 cylinder head retaining bolts present on each side as shown in **Figure 53**.
13. Remove all cylinder head retaining nuts and washers (**Figure 54**), then remove cylinder head (**Figure 55**).

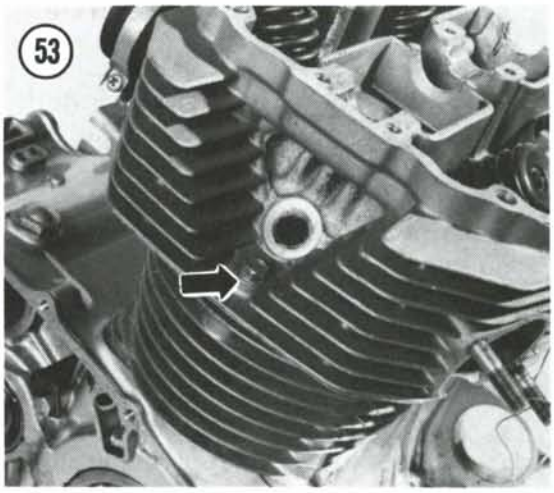


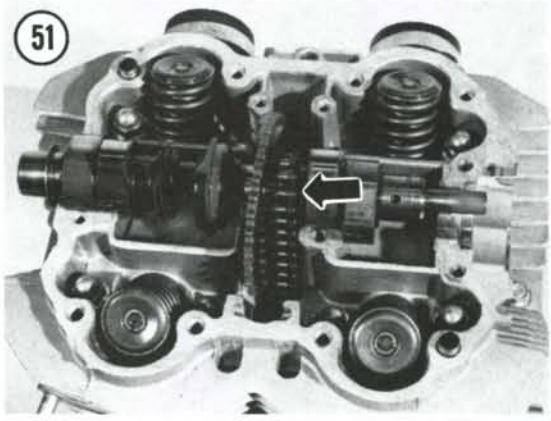


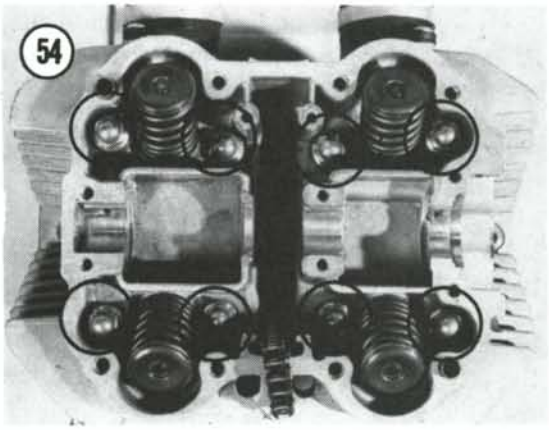


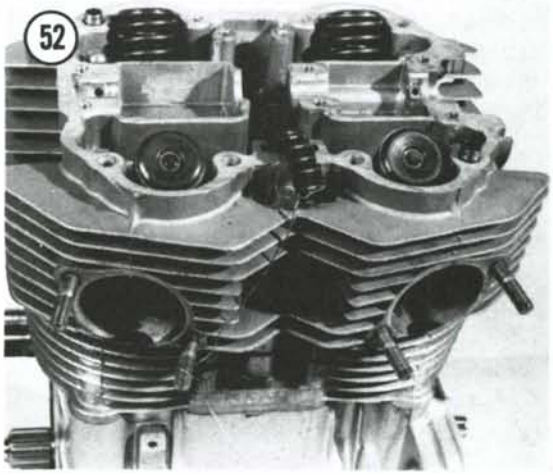


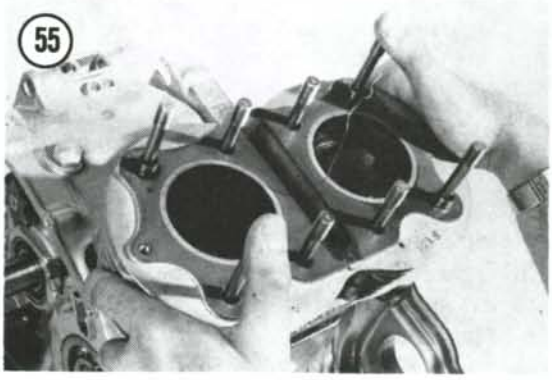

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Inspection

1. Refer to **Figure 56**. Measure the cylinder head warpage with a straightedge and feeler gauge. Warpage must not exceed 0.002 in. (0.05 mm). If clearance exceeds that value, resurface or replace the cylinder head.
2. Remove carbon from each combustion chamber with a wire brush chucked into an electric drill. This operation is easier with valves still installed in the cylinder head.

Valve Service

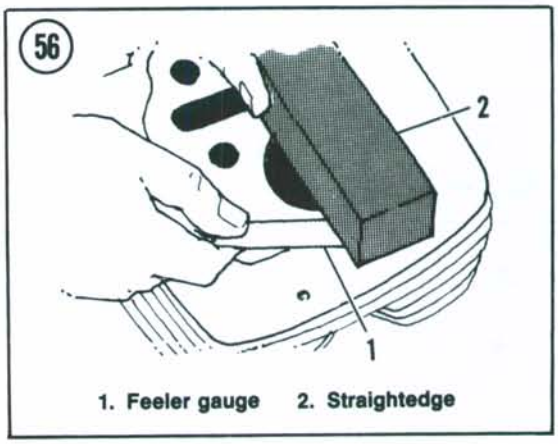
Valve service is best left to a machine shop which has the experience and equipment to handle small engines. Service procedures are given for those of you with the proper equipment to handle this operation.

1. Compress each valve spring and remove the valve keeper (**Figure 57**).
2. Remove the valve spring compressor, then the valve springs and valve components. Refer to **Figure 58**, left to right: valve spring seat; outer spring; inner spring; top collar; valve; O-seal; split collar.
3. Measure side clearance of each valve while it is positioned in the cylinder head, using a dial indicator. Refer to **Table 3** and replace any valve and/or its guide if clearance exceeds the service limits specified.
4. Measure valve stem diameter at 3 locations on the valve stem. Refer to **Table 4**. Replace any valve if its stem is worn to less than the service limits specified.

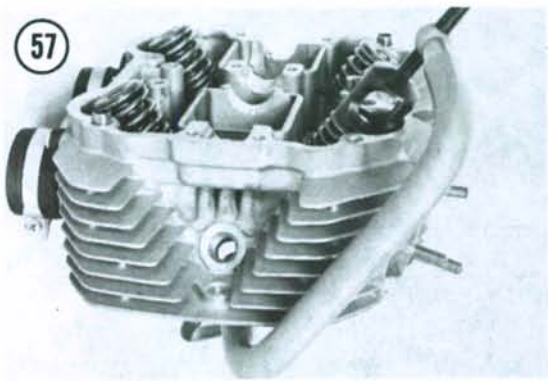
NOTE

When replacing valves, it is recommended that valve guides be replaced also. To do so, tap the guide from the cylinder head with a valve driving tool and a light hammer. Always install oversize guides when replacement is necessary, then ream to fit. Valve guide tools and reamers can be obtained through your Honda dealer.

5. Measure width of each valve face as shown in **Figure 59**. Refer to **Table 5**. Grind valves to service limits specified.
6. Measure free length of each valve spring as shown in **Figure 60**. Refer to **Table 6**. Replace any valve spring with a free length shorter than that specified in the service limits.
7. Install the valve spring seat (**Figure 61**). Then install the seal, springs and top collar. Compress the springs with a valve spring compressor and install the keeper (**Figure 62**).

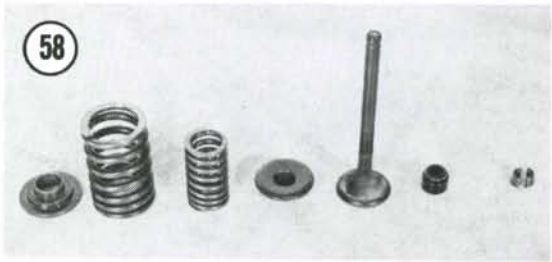


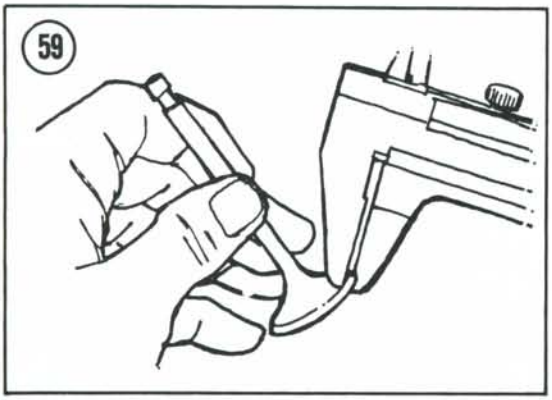
1. Feeler gauge 2. Straightedge

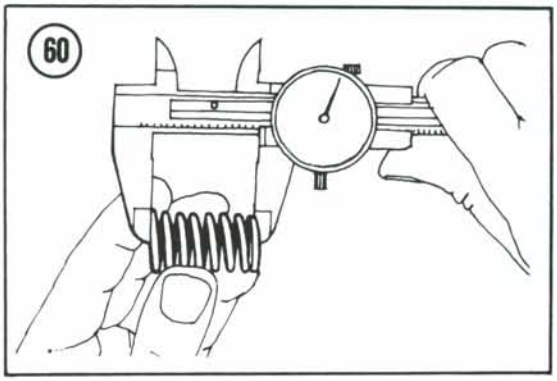


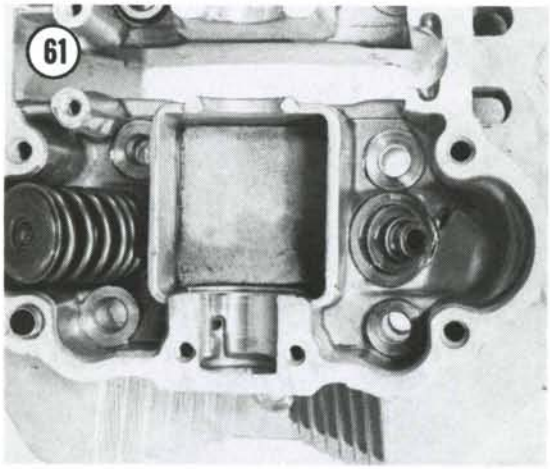
Cylinder Head Installation

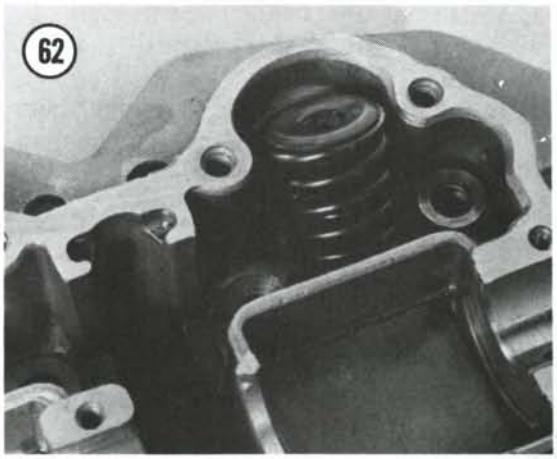
1. Clean off all old gasket material from the cylinder and cylinder head mating surfaces. Install a new cylinder head gasket. Make sure the location dowels are in place.
2. Guide the cam chain and wire up through the chain cavity in the cylinder head and install the cylinder head. Tie the cam chain wire to the cylinder head.
3. Install the cylinder head washers and 10 mm nuts. Tighten the cylinder head nuts to 22-25 ft.-lb. (3.0-3.4 mkg) in the torque sequence shown in **Figure 63**.
4. Install the cylinder head mounting bolt (**Figure 64**) on each side and tighten to 5-8 ft.-lb. (0.7-1.1 mkg).

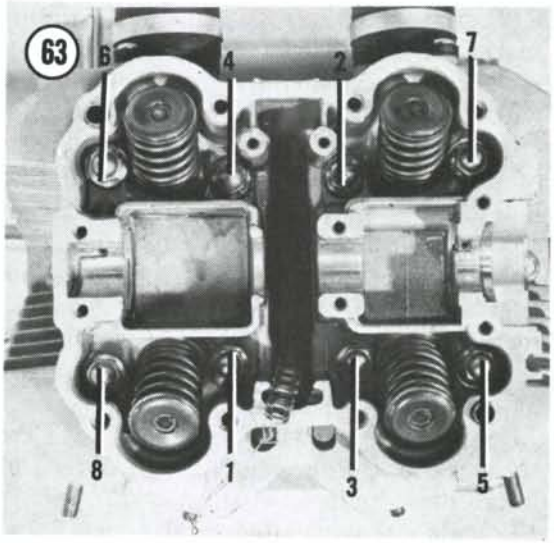

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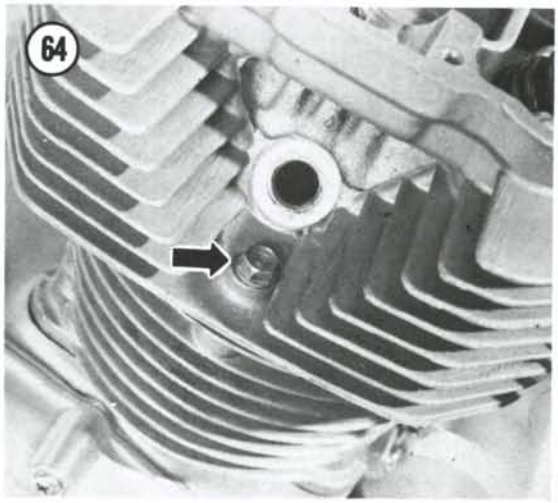

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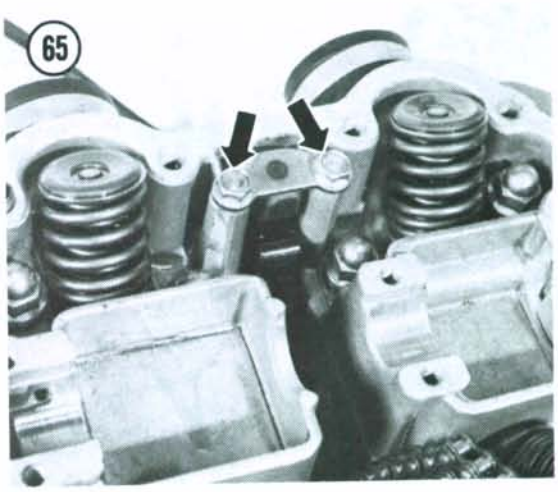

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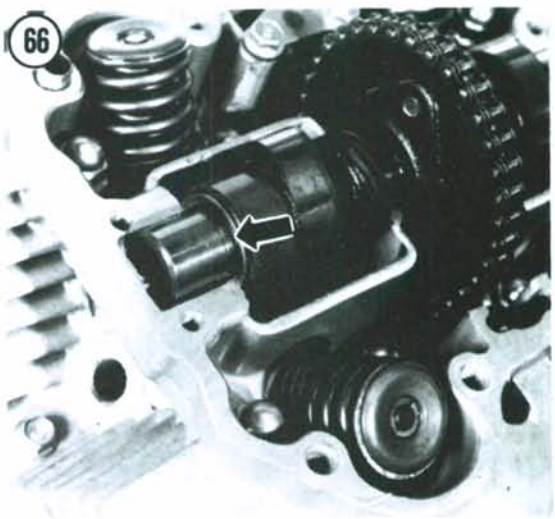
5. Install the cam chain tensioner (**Figure 65**) with the narrow side toward the cam sprocket.
6. Install the front cam chain tensioner guide.
7. Install the cam through the cam chain and slide on the cam sprocket. Loop the cam chain over the cam sprocket.

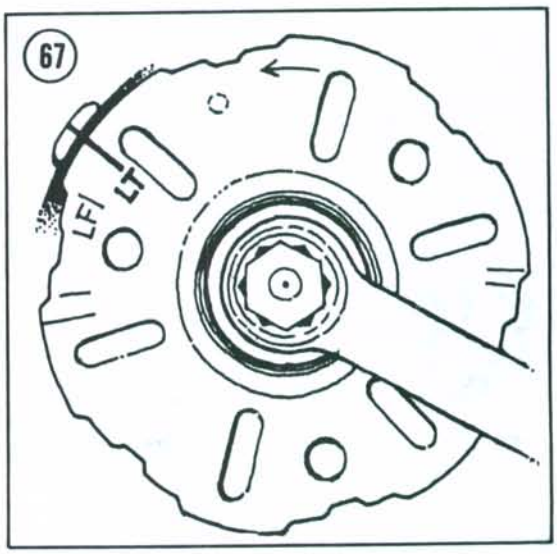
NOTE

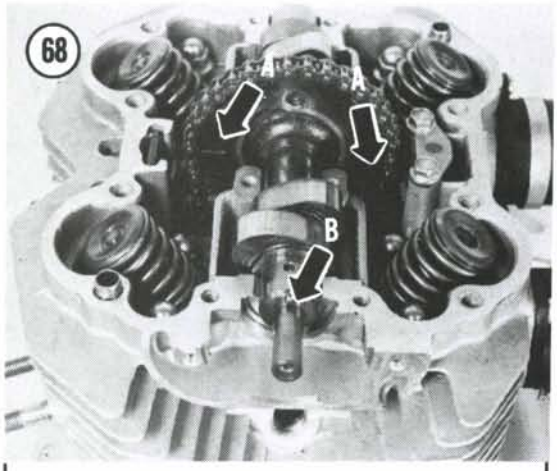
*Make sure that the thrust washer is installed on the right-hand end of the camshaft (**Figure 66**).*

8. Turn the alternator rotor with a wrench and align the "LT" mark (**Figure 67**) with the timing mark on the housing.
9. Position the cam sprocket with the timing marks (A, **Figure 68**) aligned with the top surface of the cylinder head. Position the cam with the dowel pin (B, **Figure 68**) pointing up.
10. Loosely install one of the cam sprocket attachment bolts (**Figure 69**). Rotate the alternator rotor and install the other cam sprocket bolt. Tighten both cam sprocket bolts to 13-15 ft.-lb. (1.8-2.2 mkg). Rotate the alternator rotor several times to make sure there is no binding after the cam is installed.
11. Install the oil seal (**Figure 70**) on the left-hand side of the cam.
12. Apply a light coat of gasket sealer to the sealing surface of the cylinder head cover and install the cylinder head cover.
13. Install the cylinder head cover bolts. Place a washer under the 2 center bolts on the left-hand side (A, **Figure 71**) and the cable clamps under the 2 rear corner bolts (B, **Figure 71**). Tighten the bolts securely.
14. Install the engine breather cover and gasket and secure with the bolts.
15. Align the dowel pin on the camshaft with the notch in the backside of the spark advance mechanism. Install the spark advance mechanism and secure with the center bolt (**Figure 72**).
16. Install the breaker point assembly and secure with the screws (**Figure 73**).
17. Adjust the cam chain tension (**Figure 74**) as described in Chapter Three.
18. Adjust the valve clearance and breaker point gap as described in Chapter Three.

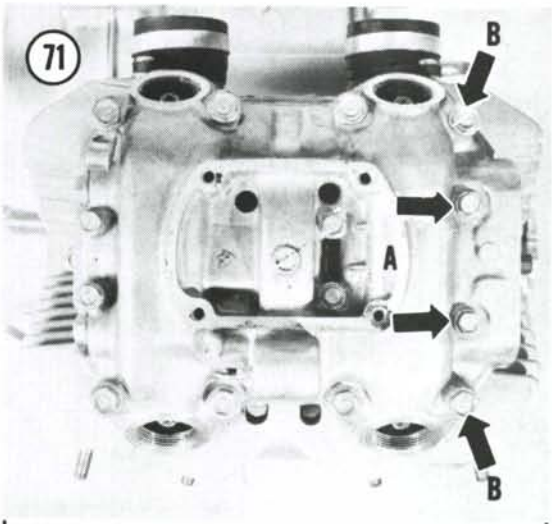




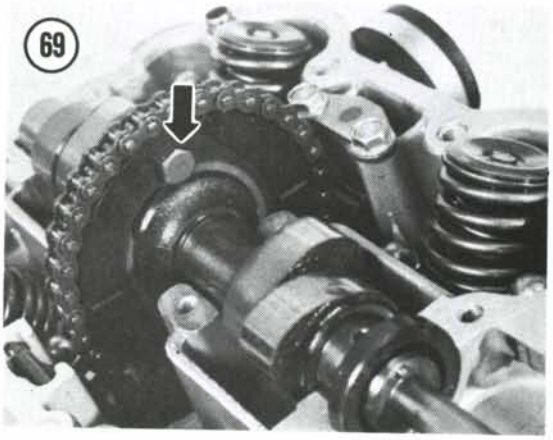


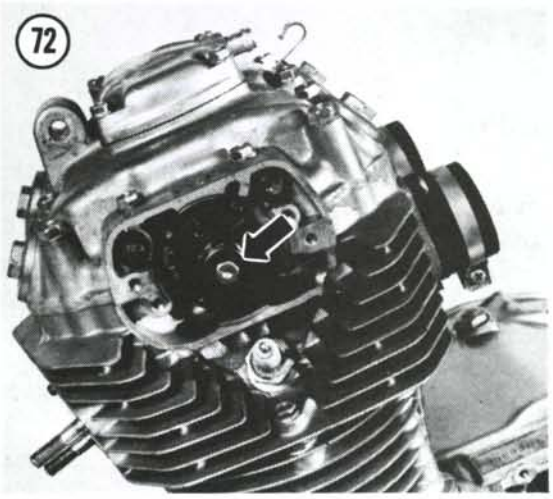


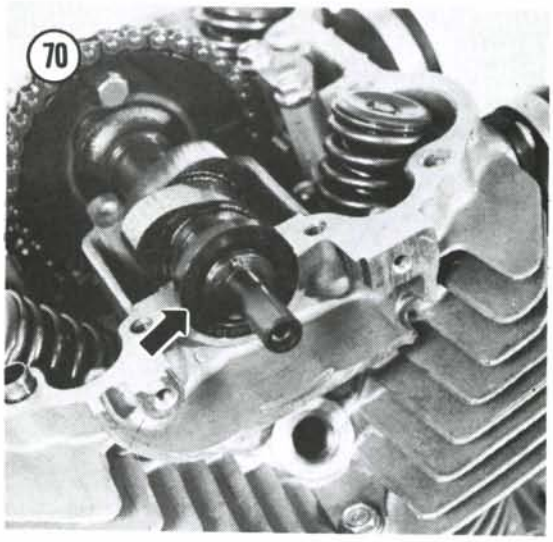
A. Timing marks B. Dowel pin

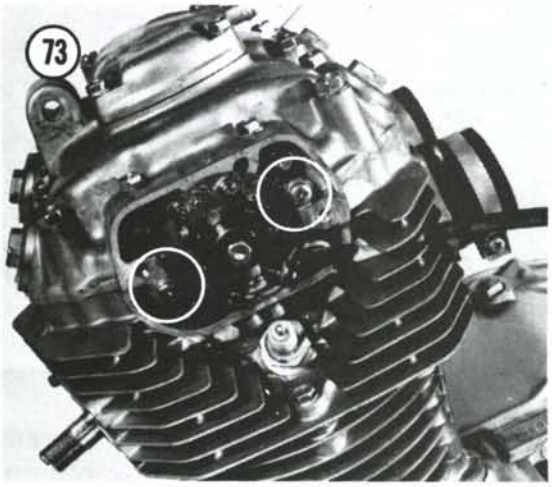


A. Center bolts B. Corner bolts



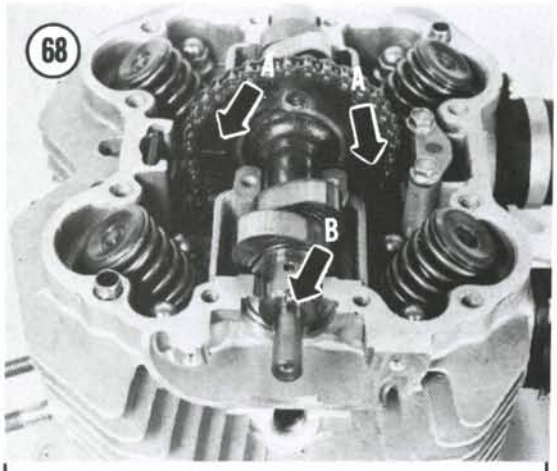




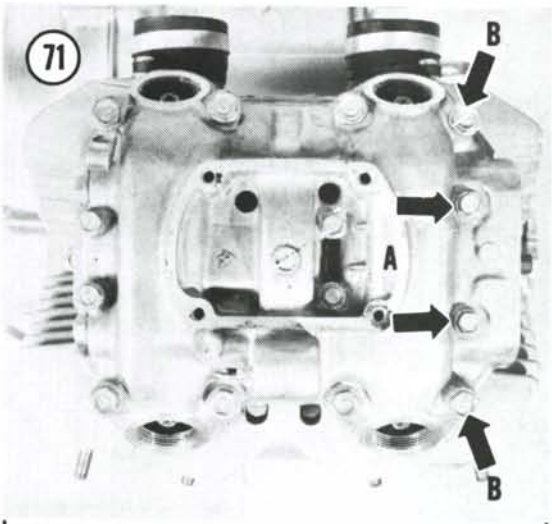


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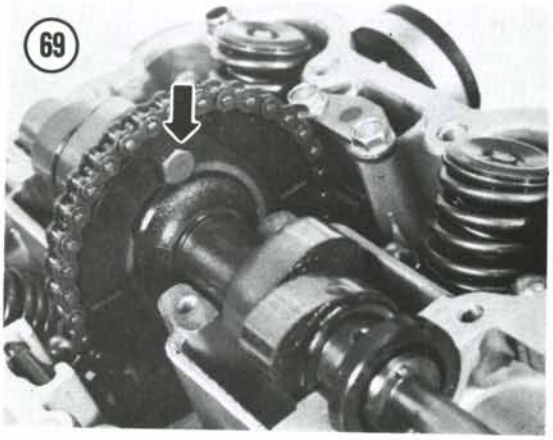
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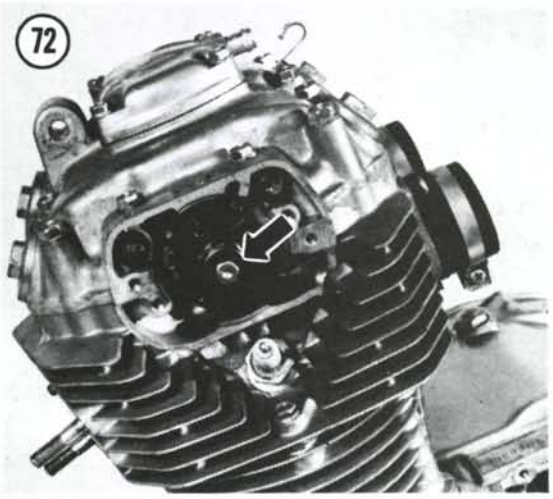


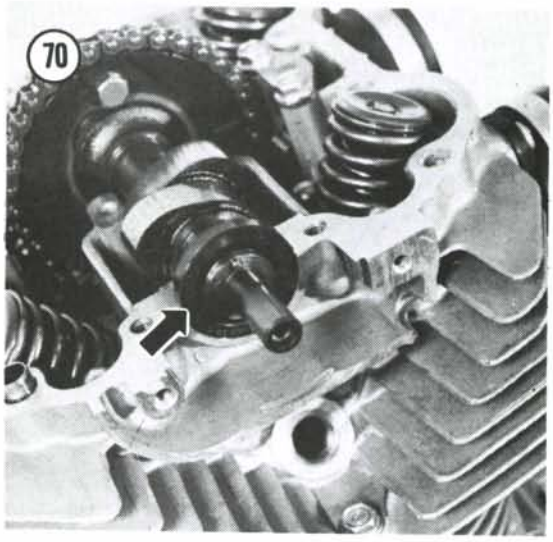
A. Timing marks B. Dowel pin

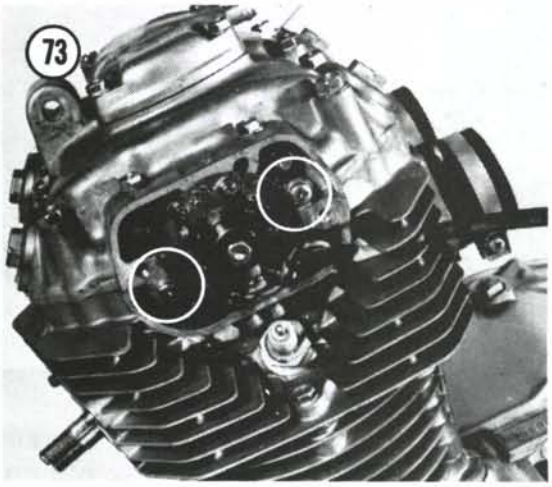


A. Center bolts B. Corner bolts









4

CYLINDER BLOCK AND PISTONS

The cylinder block is made of a cast lightweight aluminum alloy. It has cast iron liners of sufficient thickness to permit boring and honing for rebuilding purposes. The pistons are also of lightweight aluminum alloy.

Cylinder Block Removal

1. Remove the cylinder head as described in this chapter.
2. Lift the cylinder block straight up and off of the crankcase studs (**Figure 75**).

NOTE

It may be necessary to carefully tap the perimeter of the cylinder block with a plastic mallet to break it loose from the crankcase. Do so carefully as the cooling fins are thin and may be damaged if tapped on too hard.

Cylinder Block Inspection

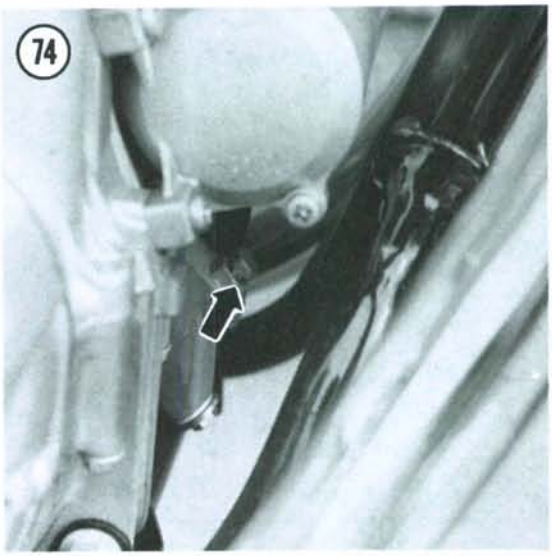
Use a cylinder gauge and measure the cylinder bore at the top, middle and bottom of each cylinder. Measurements should be made both parallel and at a right angle to the crankshaft at each measurement depth. If any 2 measurements differ by 0.02 in. (0.05 mm), rebore and hone both cylinders to the next oversize piston. Pistons are available in oversizes of 0.25, 0.50, 0.75 and 1.00 mm. If any measurement exceeds the wear limit specified in **Table 7** the cylinder block must be replaced.

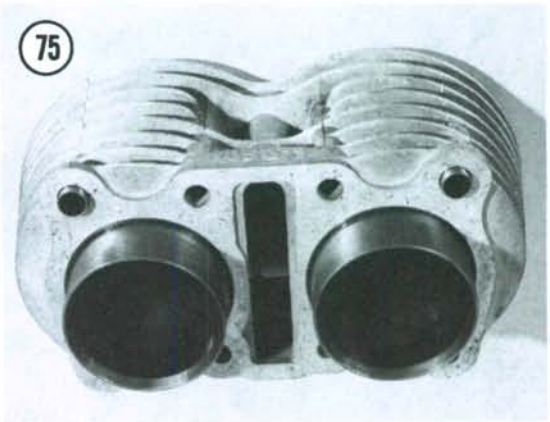
NOTE

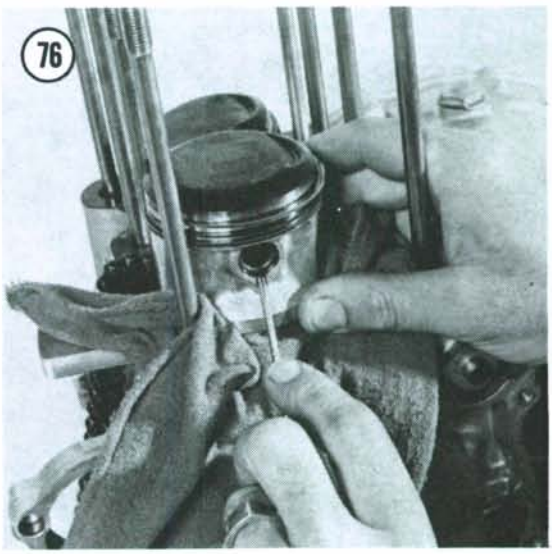
Never rebore a cylinder if the finished rebore dimension will be to the wear limit or larger. Always rebore both cylinders even if only one is worn.

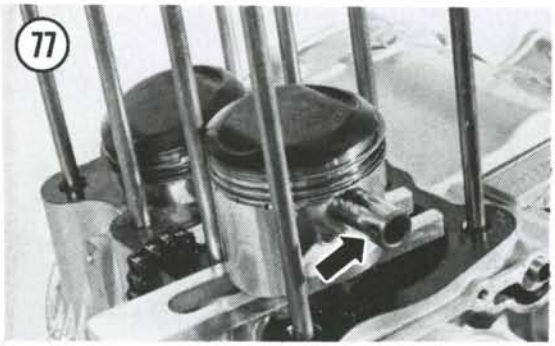
Piston Removal

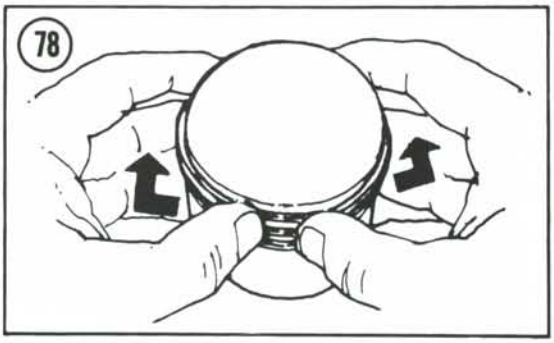
1. Support the piston with a piece of wood. Remove the piston pin clip. Stuff a clean shop cloth under the piston so the piston pin clip will not accidentally fall into the cylinder. See **Figure 76**.
2. Drive piston pin out (**Figure 77**) and remove the piston.



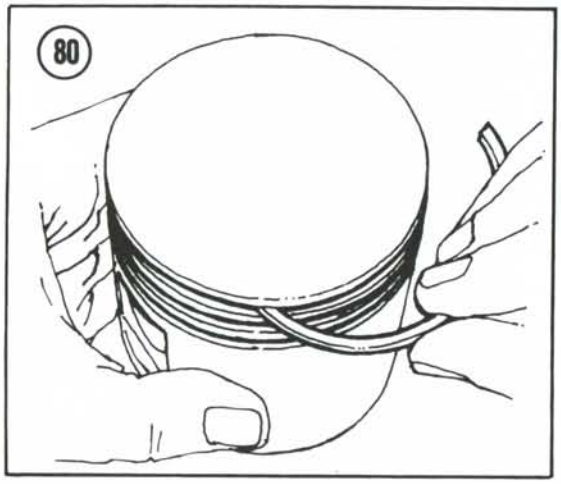


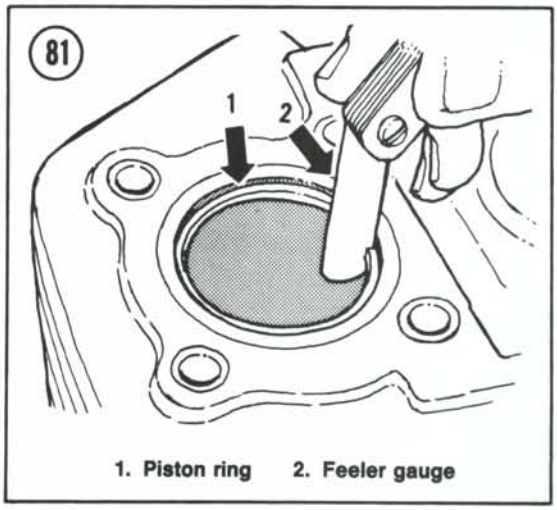












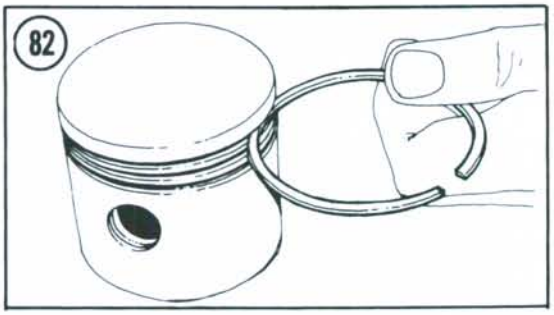
1. Piston ring 2. Feeler gauge

NOTE

If the piston pin has a very tight fit, lay rags soaked in hot water around the piston. The pin will come out quite easily after a few moments. Wipe up any excess hot water with a soft, clean cloth.

Piston Ring Replacement

1. Spread the top piston ring with a thumb on each end of the ring and remove it from the top of the piston. Take care not to scratch the piston. Repeat this procedure for each remaining ring. See **Figure 78**.
2. Scrape heavy carbon deposits from the piston crown (**Figure 79**).
3. Clean carbon and gum from the piston ring grooves (**Figure 80**) using a broken ring. Any deposits remaining in ring grooves will cause replacement rings to stick, thereby causing gas blow-by and loss of power.
4. Measure piston rings for wear as shown in **Figure 81**. Insert each piston ring into the cylinder to a depth of 0.2 in. (5 mm). To ensure that the ring is squarely in the cylinder, push it into position with the piston head. Standard gaps and wear limits are specified in **Table 8**. Replace all rings if any ring is worn so much that the piston ring gap exceeds the wear limit.
5. Before installing rings, check the fit of each one in its groove. To do so, slip the outer surface of the ring into its groove, then roll the ring completely around the piston (**Figure**



82). If any binding occurs, determine and correct its cause before proceeding.

6. After installation, measure clearance between each ring and its groove at several places around the piston as shown in **Figure 83**. Replace the ring and/or piston if ring groove clearance exceeds service limits specified in **Table 9**.

7. When replacing piston rings, install the lower one first. Be sure that they are installed so that all manufacturer's marks are toward the piston crown. If this precaution is not observed, oil pumping will occur. Position piston rings so that their gaps are staggered at 120° intervals (**Figure 84**).

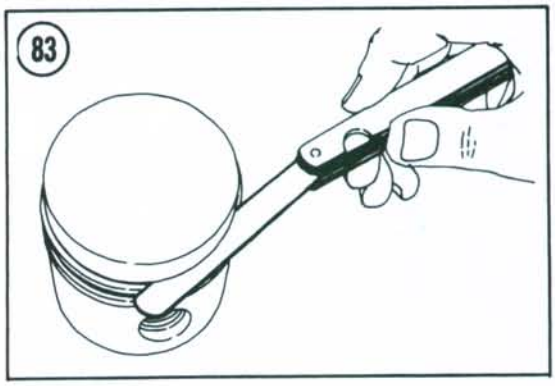
Piston Clearance

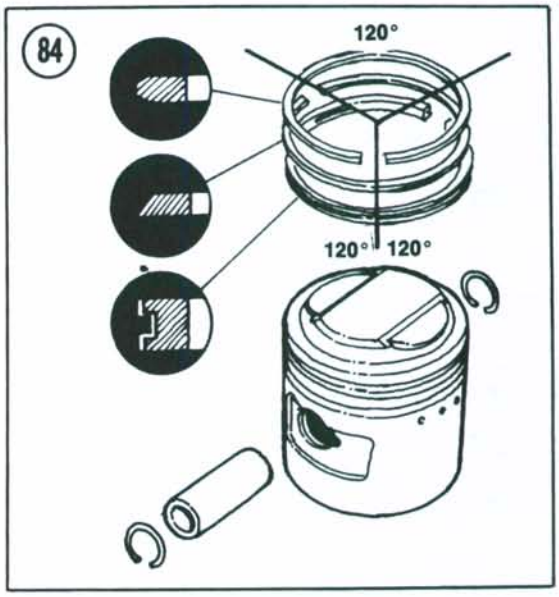
Piston clearance is the difference between maximum piston diameter and minimum cylinder diameter. Measure piston diameter across the piston skirt (**Figure 85**) at right angles to the piston pin. Standard piston clearances and wear limits are listed in **Table 10**.

A piston showing signs of seizure will result in noise, loss of power and cylinder wall damage. If such piston is reused without correction, another seizure will develop. To correct this condition, lightly smooth the affected area with No. 400 emery paper or a fine oilstone. Replace any piston which is deeply scratched.

Piston Pins

Measure piston pin diameter at its center and at both ends. Also measure piston pin bore in its piston. Standard clearance should be 0.0001-0.0006 in. (0.002-0.014 mm). Replace the pistons and/or piston pins if clearance exceeds 0.0047 in. (0.12 mm).





Piston Installation

1. Coat pistons with assembly oil and set in position over the connecting rods. Insert the piston pins. If necessary, soak pistons in hot water; the pin will push in easily. Wipe excess water off with a soft, clean cloth. Refer to **Figure 86**.

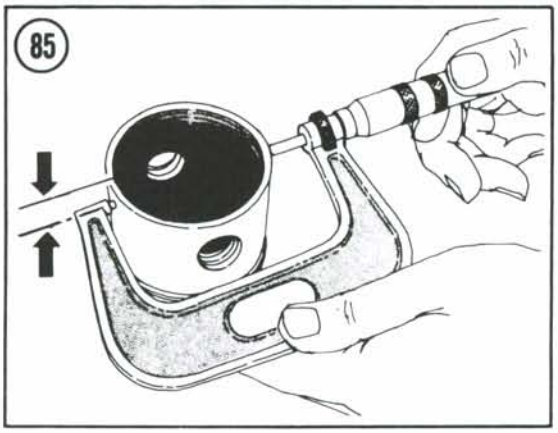
NOTE

The arrow on the piston crown should point toward the front of the engine.

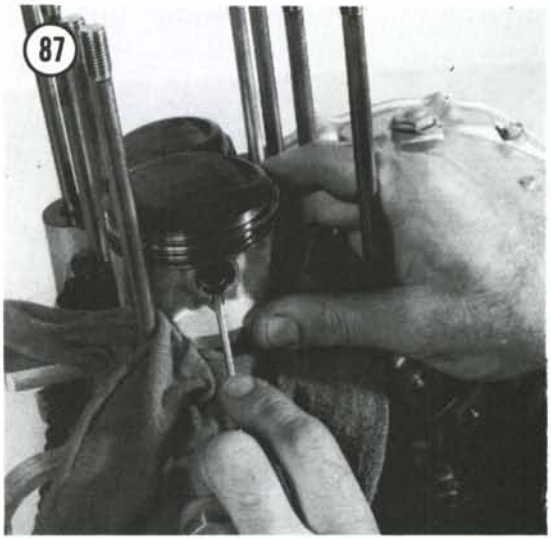
2. Install new piston pin clips; stuff a clean shop cloth under the piston to avoid losing the piston pin clip down into the cylinder. See **Figure 87**.

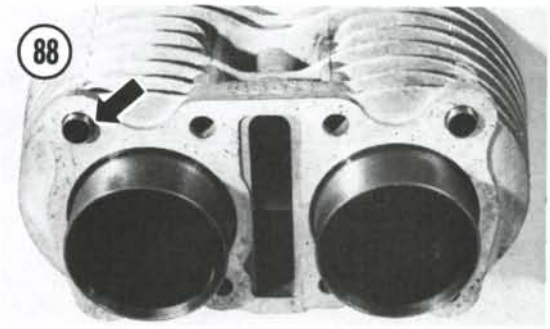
Cylinder Block Installation

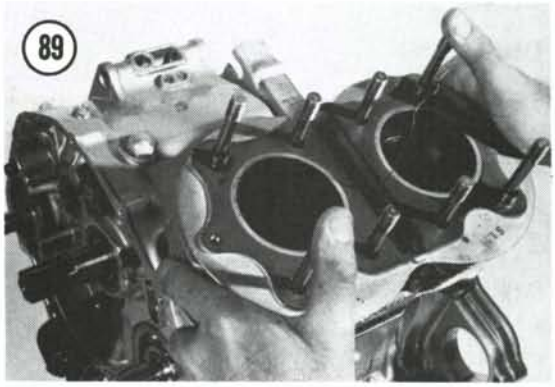
1. Coat both cylinder bores with assembly oil.

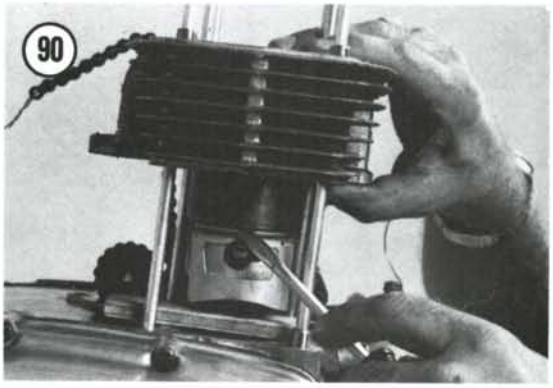






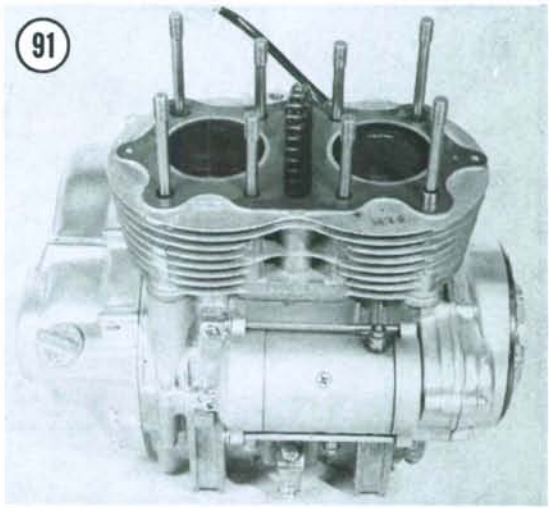






2. Install a new cylinder base gasket and install the locating dowels (**Figure 88**).
3. Guide the cam chain and wire up through the chain cavity in the cylinder block and install the cylinder block onto the crankcase studs (**Figure 89**). Tie the cam chain wire to the cylinder head.
4. Compress each piston ring with your fingers or screwdriver as it enters the cylinder bore (**Figure 90**). If a screwdriver is used, be careful not to damage or nick the piston surface.

5. Push the cylinder block all the way down until it is completely seated (**Figure 91**).
6. Install the seals onto the locating dowels (**Figure 92**).

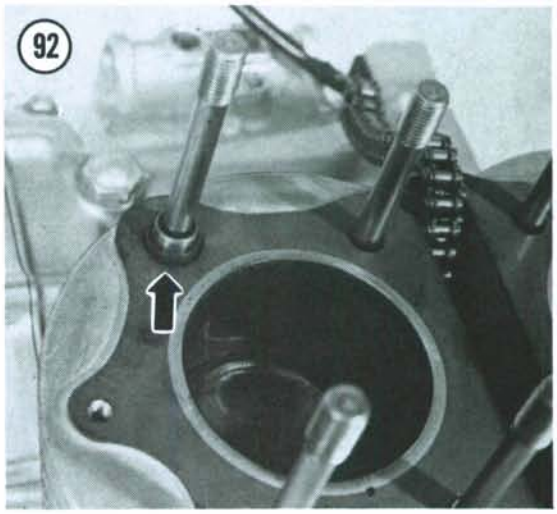


CRANKCASE

The crankcase halves can be split without the use of any special tools. It is necessary to split the crankcase halves to service the crankshaft, transmission shaft assemblies, internal shifter components and the kickstarter.

Disassembly

1. Remove the cylinder head, cylinder block and pistons as described in this chapter.
2. Remove the one upper crankcase bolt (**Figure 93**).
3. Turn the crankcase assembly upside down and remove the lower crankcase bolts (**Figure 94**).
4. Carefully tap around the perimeter of the crankcase with a plastic mallet–do not use a metal hammer–to help separate the 2 case halves. Remove the lower crankcase half from the upper crankcase half (**Figure 95**).

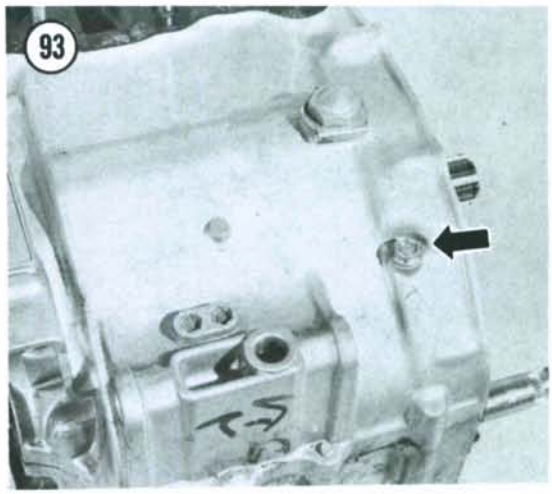


CAUTION

If it is necessary to pry the crankcase halves apart, do it very carefully so that you do not mar the gasket surfaces. Damaged mating surfaces will cause an oil leak.

Inspection

Lubricating oil passages are machined in the crankcase. Be very careful that these passages do not become clogged during service operations. If any passage is clogged, blow it out with compressed air. Examine the mating surfaces of both halves for nicks or scratches which will result in an oil leak. Clean off all traces of old sealing compound.

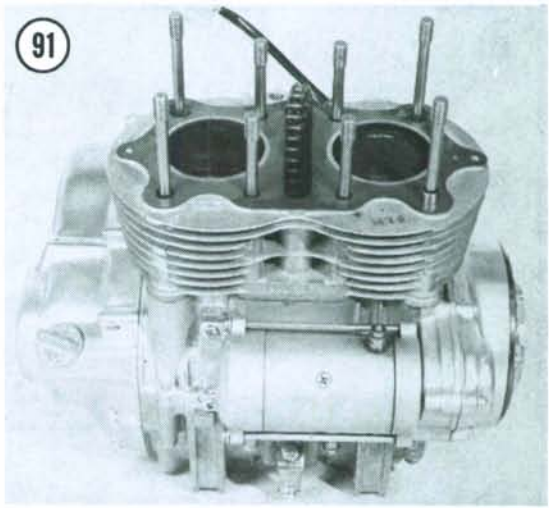


Reassembly

1. Be sure that the mating surfaces of both crankcase halves are clean.
2. Within the lower crankcase half, loosen the cam chain tensioner locknut and loosen the adjuster bolt (A, **Figure 96**). Push down

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5. Push the cylinder block all the way down until it is completely seated (**Figure 91**).
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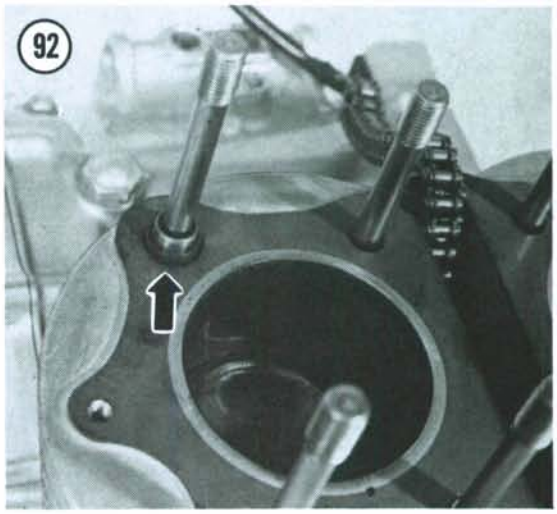


CRANKCASE

The crankcase halves can be split without the use of any special tools. It is necessary to split the crankcase halves to service the crankshaft, transmission shaft assemblies, internal shifter components and the kickstarter.

Disassembly

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2. Remove the one upper crankcase bolt (**Figure 93**).
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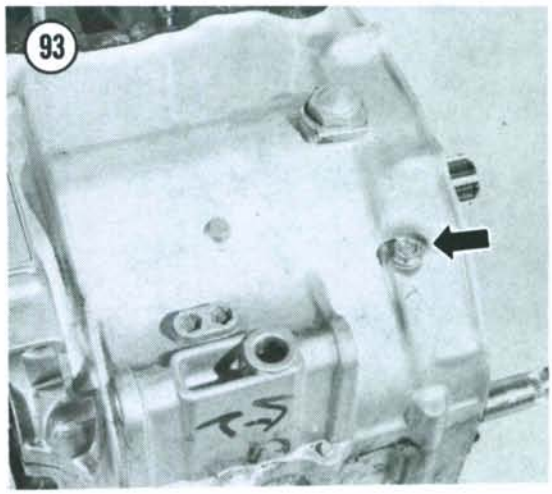


CAUTION

If it is necessary to pry the crankcase halves apart, do it very carefully so that you do not mar the gasket surfaces. Damaged mating surfaces will cause an oil leak.

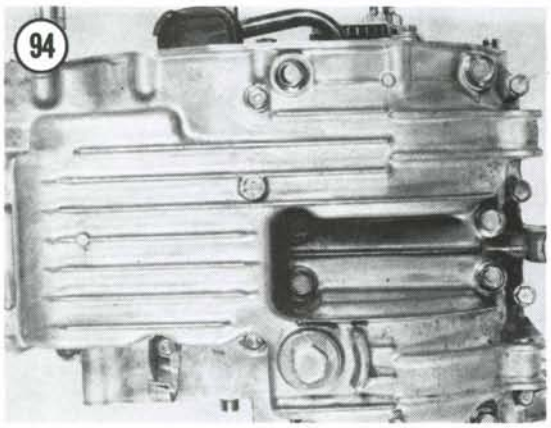
Inspection

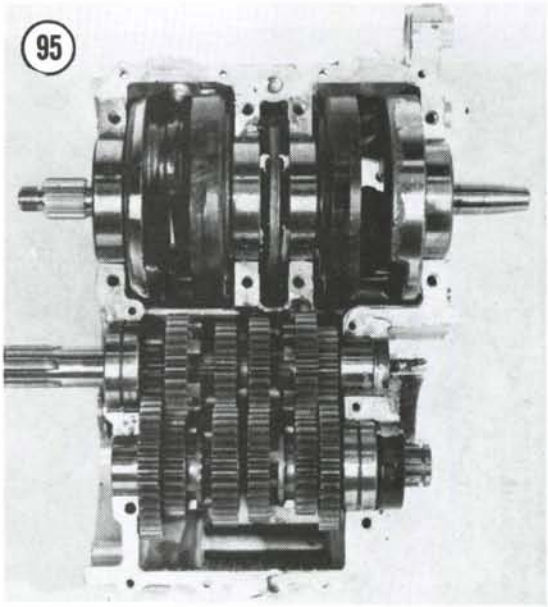
Lubricating oil passages are machined in the crankcase. Be very careful that these passages do not become clogged during service operations. If any passage is clogged, blow it out with compressed air. Examine the mating surfaces of both halves for nicks or scratches which will result in an oil leak. Clean off all traces of old sealing compound.

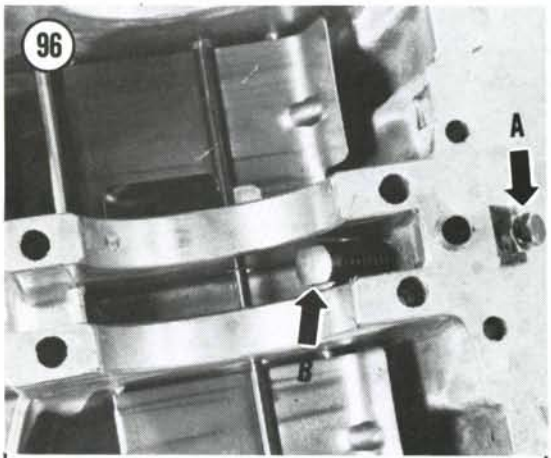


Reassembly

1. Be sure that the mating surfaces of both crankcase halves are clean.
2. Within the lower crankcase half, loosen the cam chain tensioner locknut and loosen the adjuster bolt (A, **Figure 96**). Push down







A. Adjuster bolt B. Tensioner pushbar

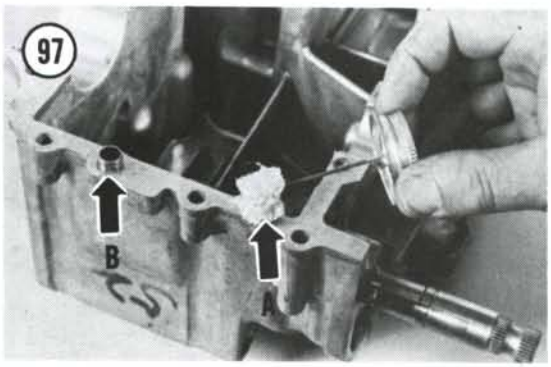
on the tensioner pushbar (B, **Figure 96**) and tighten the adjuster bolt and locknut.

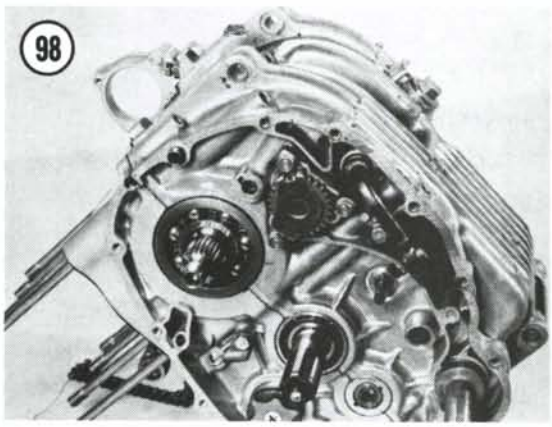
3. Coat the mating surfaces with liquid gasket compound (A, **Figure 97**). Install the dowel pins (B, **Figure 97**).

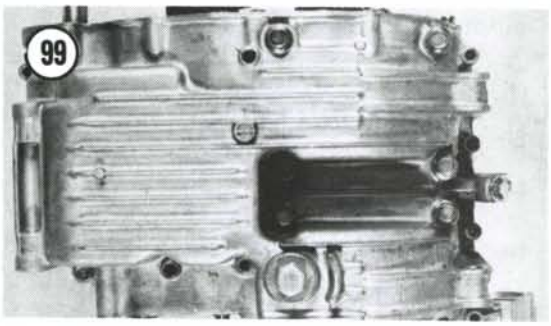
CAUTION

Do not get gasket compound on dowel pins or surfaces which do not mate.

4. Reassemble the crankcase halves (**Figure 98**) and install the lower crankcase half bolts (**Figure 99**) finger-tight.

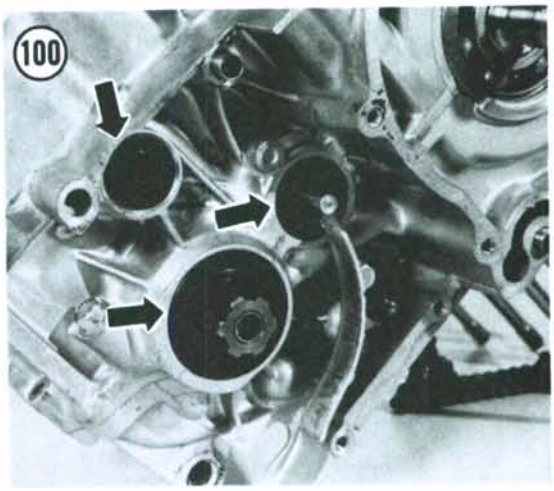






4

5. Be sure that the oil seals are in place (**Figure 100**).
6. Rotate the crankshaft and transmission assemblies to make sure there is no binding (**Figure 101**).
7. Tighten the lower crankcase half bolts in a crisscross pattern to the following torque specifications:
   a. 6 mm bolts: 6.5-8.7 ft.-lb. (0.9-1.2 mkg).
   b. 8 mm bolts: 14.5-16.6 ft.-lb. (2.0-2.3 mkg).
8. Install the upper crankcase bolt (**Figure 102**) and tighten to 6.5-8.7 ft.-lb. (0.9-1.2 mkg).

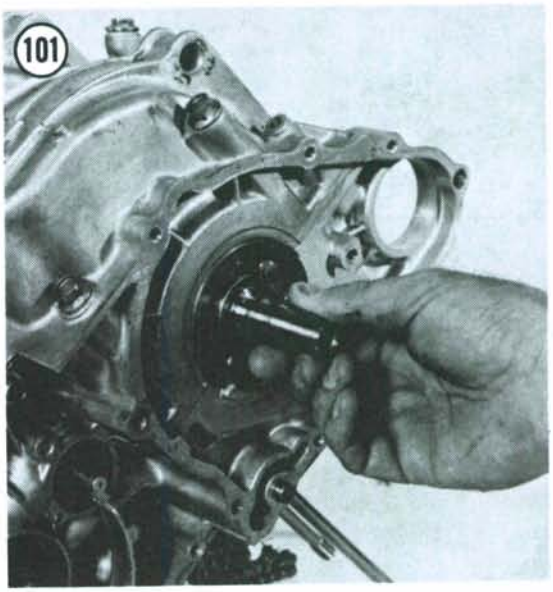


CRANKSHAFT

The crankshaft operates under conditions of high stress and dimensional tolerances are critical. It is necessary to locate and correct crankshaft defects early to prevent more serious troubles later.

Removal

1. Split the crankcase halves as described in this chapter.
2. Lift out the cam chain tensioner guide (**Figure 103**) and remove the crankshaft assembly.

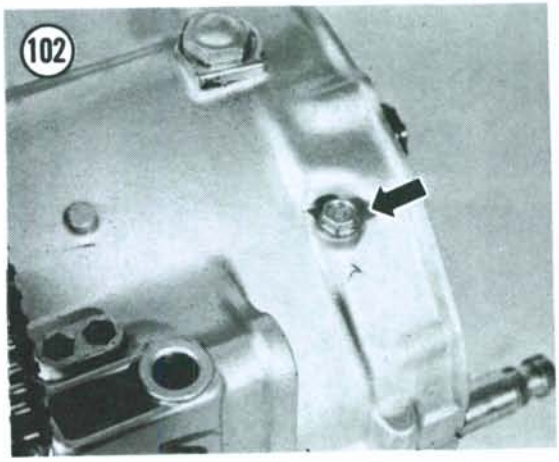


Inspection

Measurement locations and support points are shown in **Figure 104**. Replace the crankshaft if runout exceeds 0.004 in. (0.1 mm) at locations C, D, E and F in **Figure 104**.

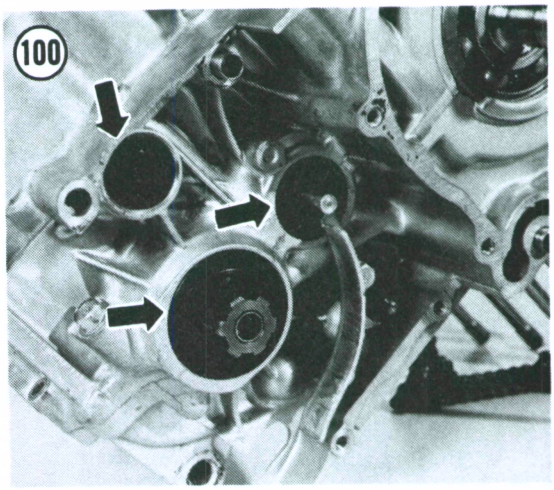
Installation

1. Install the cam chain onto the sprocket on the crankshaft.
2. Align the dowel pin hole in the crankshaft outer bearing (A, **Figure 105**) with the dowel pin in the crankcase (A, **Figure 106**).
3. Align the dowel pins on the inner bearings (B, **Figure 105**) with the indentations in the crankcase half (B, **Figure 106**).
3. After the proper bearing alignment is achieved in Step 2 and Step 3, install the crankshaft assembly into the upper crankcase half (**Figure 107**). Make sure the cam chain is fed through the opening in the upper crankcase half.



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5. Be sure that the oil seals are in place (**Figure 100**).
6. Rotate the crankshaft and transmission assemblies to make sure there is no binding (**Figure 101**).
7. Tighten the lower crankcase half bolts in a crisscross pattern to the following torque specifications:
   a. 6 mm bolts: 6.5-8.7 ft.-lb. (0.9-1.2 mkg).
   b. 8 mm bolts: 14.5-16.6 ft.-lb. (2.0-2.3 mkg).
8. Install the upper crankcase bolt (**Figure 102**) and tighten to 6.5-8.7 ft.-lb. (0.9-1.2 mkg).

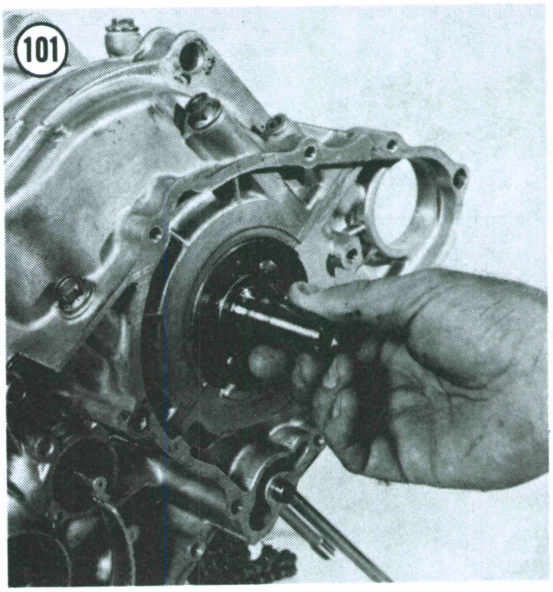


CRANKSHAFT

The crankshaft operates under conditions of high stress and dimensional tolerances are critical. It is necessary to locate and correct crankshaft defects early to prevent more serious troubles later.

Removal

1. Split the crankcase halves as described in this chapter.
2. Lift out the cam chain tensioner guide (**Figure 103**) and remove the crankshaft assembly.

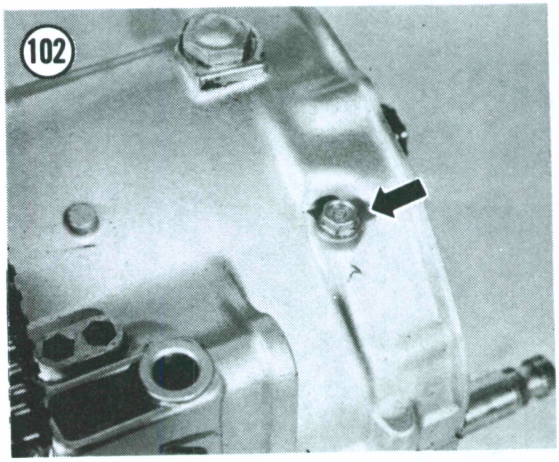


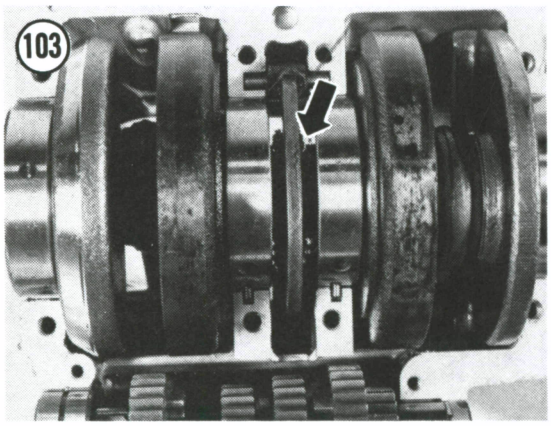
Inspection

Measurement locations and support points are shown in **Figure 104**. Replace the crankshaft if runout exceeds 0.004 in. (0.1 mm) at locations C, D, E and F in **Figure 104**.

Installation

1. Install the cam chain onto the sprocket on the crankshaft.
2. Align the dowel pin hole in the crankshaft outer bearing (A, **Figure 105**) with the dowel pin in the crankcase (A, **Figure 106**).
3. Align the dowel pins on the inner bearings (B, **Figure 105**) with the indentations in the crankcase half (B, **Figure 106**).
3. After the proper bearing alignment is achieved in Step 2 and Step 3, install the crankshaft assembly into the upper crankcase half (**Figure 107**). Make sure the cam chain is fed through the opening in the upper crankcase half.



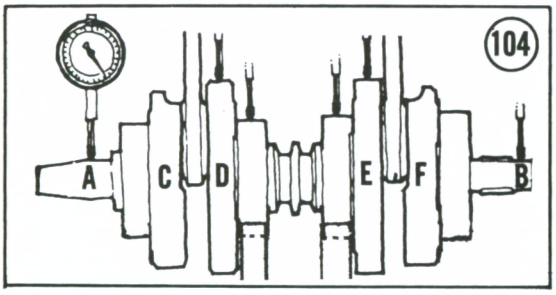


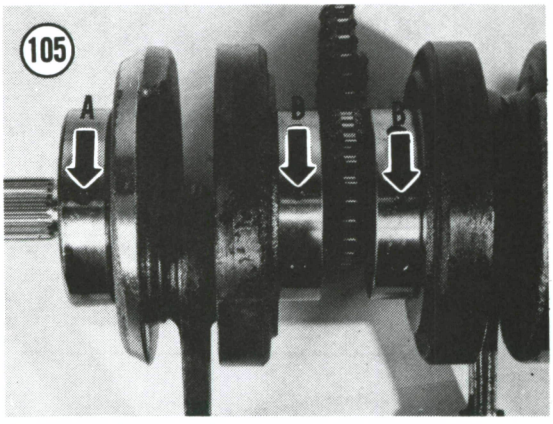
4. Correctly mesh the cam chain onto the sprocket on the crankshaft. Pull out and hold the chain taut. Tie the chain to one of the crankcase studs. This will prevent the chain from slipping off of the crankshaft sprocket during further engine reassembly.
5. Install the cam chain tensioner guide (**Figure 103**).
6. Reassemble the crankcase halves as described in this chapter.

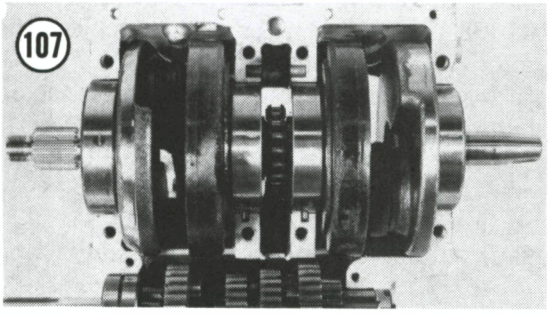
OIL PUMP

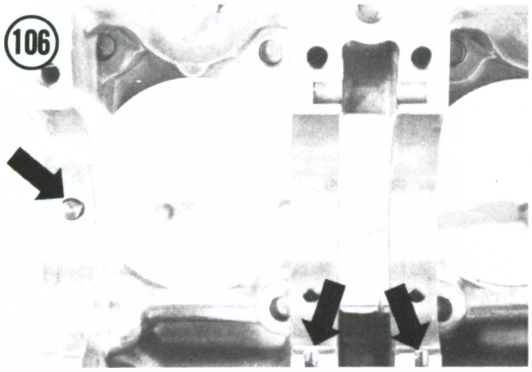
Removal/Inspection/ Installation

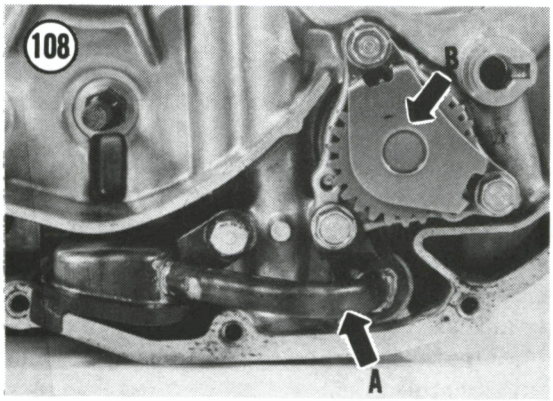
1. Remove the bolts securing the oil filter screen assembly (A, **Figure 108**) and remove the assembly.
2. Remove the bolts securing the oil pump (B, **Figure 108**) and remove the oil pump bracket and oil pump. Don't lose the small O-rings in the crankcase.
3. Remove the screws securing the oil pump assembly together. Disassemble all parts and clean in solvent. Thoroughly dry with compressed air.



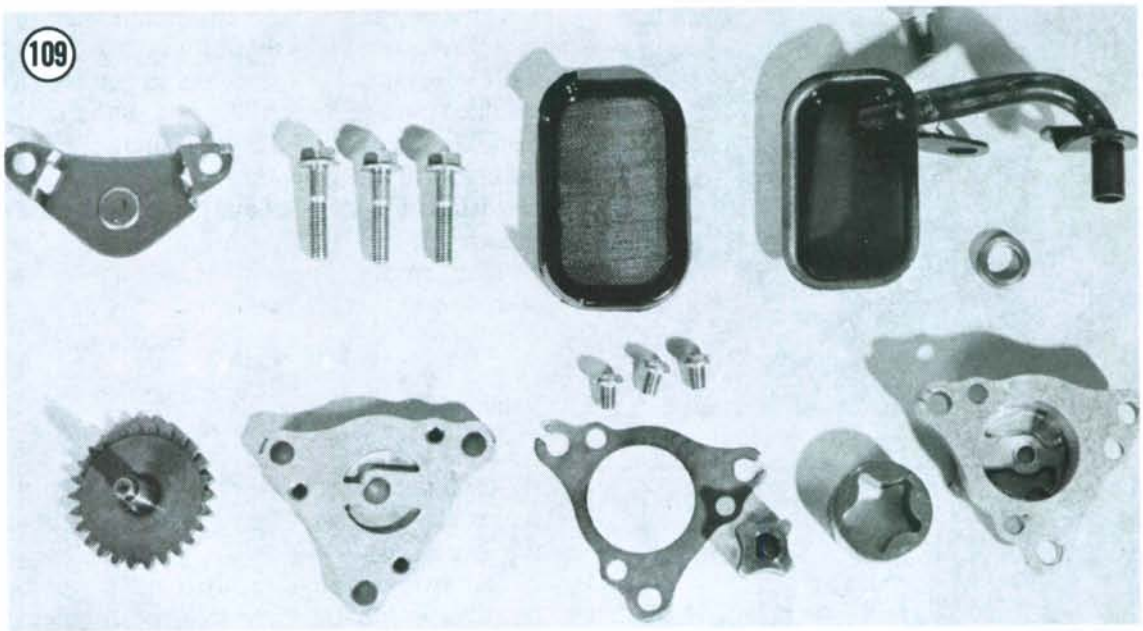




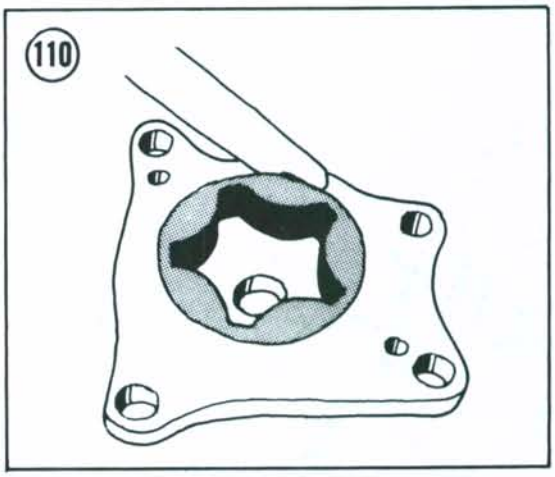




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4. **Figure 109** shows the oil pump disassembled.
5. Inspect all parts for wear and abrasion. Use a flat feeler gauge and measure the clearance between the outer rotor and the oil pump body (**Figure 110**). If the clearance is 0.0138 in. (0.35 mm) or greater, replace the rotor or the entire assembly.
6. Install a new gasket and reassemble the oil pump.
7. Make sure O-rings are installed in the crankcase (**Figure 111**).
8. Install the oil pump and bracket.
9. Install the oil filter screen assembly.



KICKSTARTER

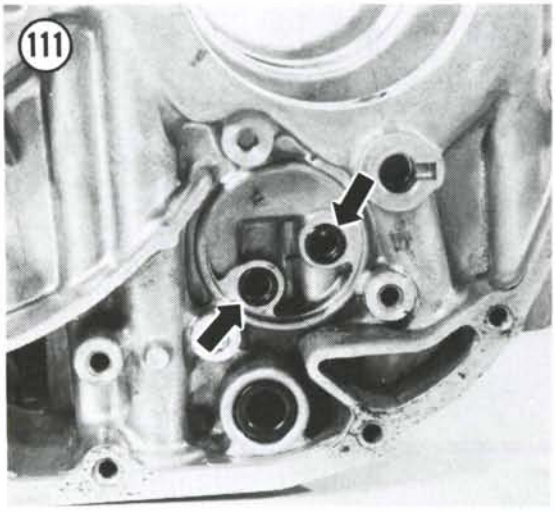
Removal/Inspection/ Installation

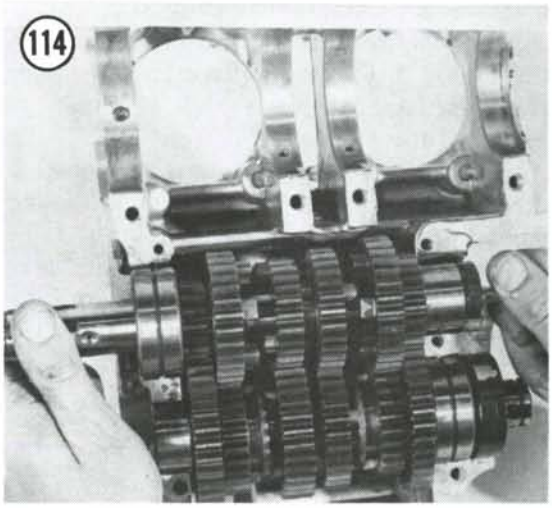
1. Remove the circlip and thrust washer (**Figure 112**).
2. Slide off the ratchet guide plate, spring, thrust washer, starter ratchet, setting spring, thrust washer and the kickstarter gear from the shaft.
3. Withdraw the kickstarter shaft from the crankcase.
4. **Figure 113** shows the kickstarter shaft disassembled.
5. Inspect all parts for wear or damage. Check for broken or missing teeth on the gears. Replace any that are defective.
6. Install by reversing these removal steps.

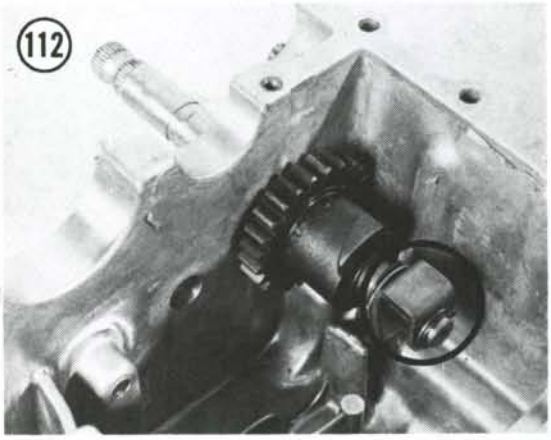
6-SPEED TRANSMISSION

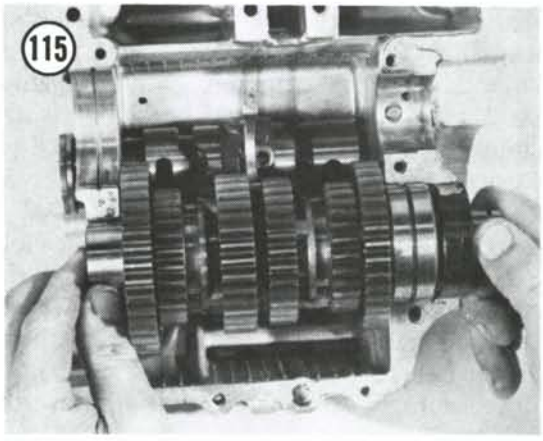
Removal/Installation

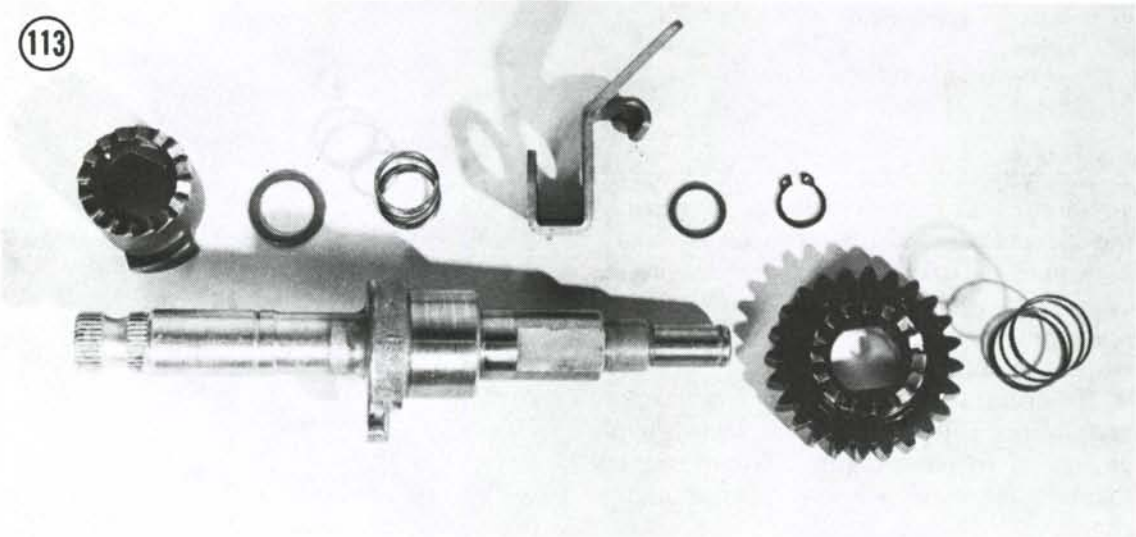
1. Split the crankcase and remove the crankshaft assembly.
2. Lift out the countershaft assembly (**Figure 114**).
3. Lift out the main shaft assembly (**Figure 115**).


111

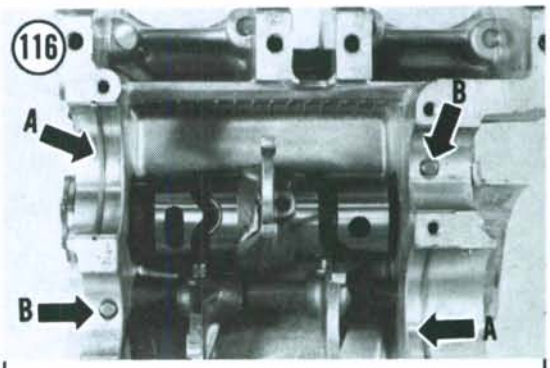

114


112


115


113

4. Make sure that the bearing retainer 1/2 clips (A, **Figure 116**) and the locating dowels (B, **Figure 116**) are in place in the upper crankcase half.
5. Install the main shaft (**Figure 117**). Make sure that the 1/2 set ring and the locating dowel are properly positioned into the receptacles in the main shaft bearings.
6. Install the countershaft (**Figure 118**). Make sure that the 1/2 set ring and the locating dowel are properly positioned into the receptacles in the countershaft bearings.
7. Install the crankshaft assembly and reassemble the crankcase halves as described in this chapter.



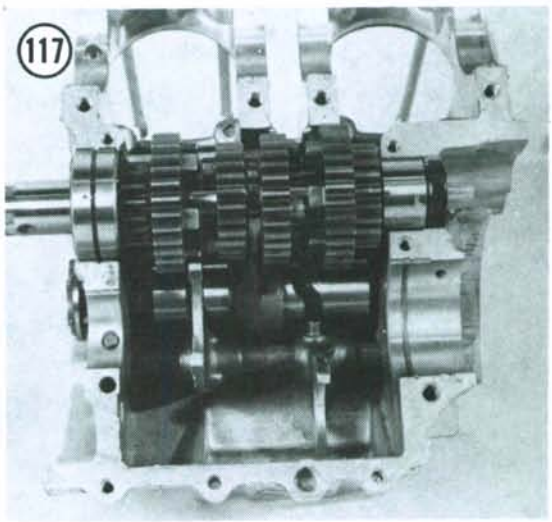
A. Bearing retainer 1/2 clips
B. Locating dowels

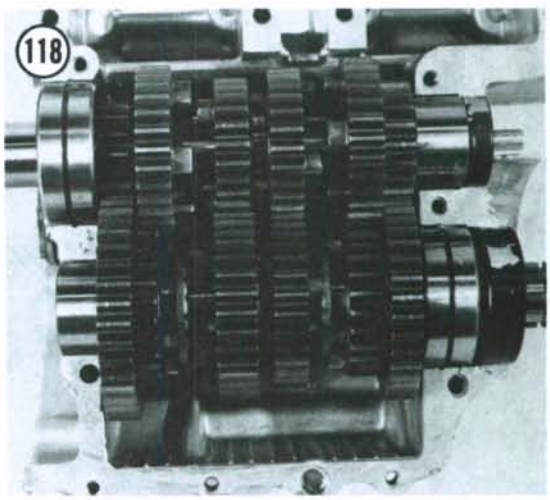
Preliminary Inspection

Prior to disassembling the transmission shaft assemblies they should be cleaned and inspected. Place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry. Repeat for the other shaft assembly.
1. After they have been cleaned, visually inspect the components of the assemblies for excessive wear. Any burrs, pitting or roughness on the teeth of a gear will cause wear on the mating gear. Minor roughness can be cleaned up with an oilstone but there's little point in wasting time attempting to remove deep scars.

NOTE

Defective gears should be replaced. It's a good idea to replace the mating gear on the other shaft even though it may not show as much wear or damage.





2. Carefully check the engagement dogs. If any are chipped, worn, rounded or missing, the affected gear must be replaced.
3. Rotate the transmission bearings in the crankcases by hand. Check for roughness, noise and radial play. Any bearing that is suspect should be replaced.
4. If the transmission shafts are satisfactory and are not going to be disassembled, apply engine oil to all components and reinstall them in the crankcase as described in this chapter.

Main Shaft Disassembly/Inspection/ Assembly

Refer to **Figure 119** for this procedure.

1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry.
2. Slide off the oil seal and the needle bearing assembly.
3. Slide off the thrust washer and the 2nd gear.
4. Slide off the 6th gear and the 6th gear bushing.
5. Slide off the splined washer and remove the circlip.
6. Slide off the 3rd/4th combination gear.
7. Remove the circlip and splined washer.
8. Slide off the 5th gear.
9. Check each gear for excessive wear, burrs, pitting or chipped or missing teeth. Make sure the lugs on the gears are in good condition.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the countershaft even though it may not show as much wear or damage.

NOTE

The 1st gear is part of the shaft; therefore, if the gear is defective, the shaft must be replaced.

10. Make sure that all gears slide smoothly on the main shaft splines.

NOTE

It is a good idea to replace all circlips every other time the transmission is disassembled to ensure proper gear alignment.

11. Slide on the 5th gear and install the splined washer and circlip.
12. Slide on the 3rd/4th combination gear and install the circlip and splined washer. Install the smaller diameter gear first.
13. Install the circlip and the splined washer.
14. Slide on the 6th gear bushing and the 6th gear.
15. Slide on the 2nd gear and the thrust washer.
16. Install the needle bearing assembly and the oil seal.

Countershaft Disassembly/Inspection/ Assembly

Refer to **Figure 119** for this procedure.

1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry.
2. Remove the needle bearing assembly.
3. Slide off the thrust washer and the 1st gear.
4. Slide off the thrust washer and the 5th gear.
5. Remove the circlip and thrust washer and slide off the 3rd gear and the 3rd gear bushing.
6. Slide off the splined lockwasher. Rotate the splined washer in either direction to disengage the tangs from the raised splines on the transmission shaft. Slide off the splined washer.
7. Slide off the 4th and the 6th gears.
8. Check each gear for excessive wear, burrs, pitting or chipped or missing teeth. Make sure the lugs on the gears are in good condition.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the main shaft even though it may not show as much wear or damage. The 5th gear is part of the shaft; therefore, if the gear is defective, the shaft must be replaced.

9. Make sure that all gears slide smoothly on the countershaft splines.

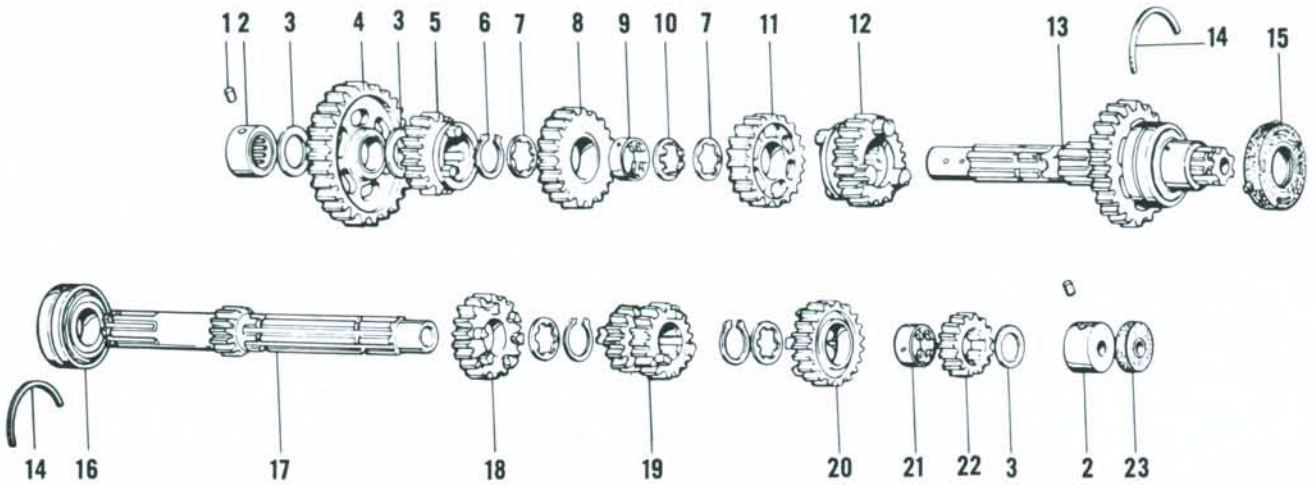
NOTE

It is a good idea to replace the circlip every other time the transmission is disassembled to ensure proper gear alignment.

10. Slide on the 6th gear and the 4th gear.
11. Slide on the splined washer. Rotate the splined washer in either direction so its tangs

(119)

6-SPEED TRANSMISSION



1. Dowel pin
2. Needle bearing assembly
3. Thrust washer
4. Countershaft 1st gear
5. Countershaft 5th gear
6. Circlip
7. Splined washer
8. Countershaft 3rd gear
9. Countershaft 3rd gear bushing
10. Splined lockwasher
11. Countershaft 4th gear
12. Countershaft 6th gear
13. Countershaft/2nd gear
14. 1/2 set ring
15. Oil seal
16. Ball bearing
17. Main shaft/1st gear
18. Main shaft 5th gear
19. Main shaft 3rd/4th combination gear
20. Main shaft 6th gear
21. Main shaft 6th gear bushing
22. Main shaft 2nd gear
23. Oil seal

are engaged into the groove in the raised splines of the transmission shaft.
12. Slide on the splined lockwasher so that the tangs go into the open areas of the splined washer and lock the washer in place.
13. Slide on the 3rd gear bushing and the 3rd gear (flush side on first).
14. Slide on the splined washer and circlip.
15. Slide on the 5th gear and thrust washer.
16. Slide on the 1st gear (flush side on last) and install the thrust washer.
17. Install the needle bearing assembly.

5-SPEED TRANSMISSION

Preliminary Inspection

Prior to disassembling the transmission shaft assemblies, they should be cleaned and inspected. Place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry. Repeat for the other shaft assembly.
1. After they have been cleaned, visually inspect the components of the assemblies for excessive wear. Any burrs, pitting or roughness on the teeth of a gear will cause wear on the mating gear. Minor roughness can be cleaned up with an oilstone but there's little point in wasting time attempting to remove deep scars.

NOTE

Defective gears should be replaced. It's a good idea to replace the mating gear on the other shaft even though it may not show as much wear or damage.

2. Carefully check the engagement dogs. If any are chipped, worn, rounded or missing, the affected gear must be replaced.
3. Rotate the transmission bearings in the crankcases by hand. Check for roughness, noise and radial play. Any bearing that is suspect should be replaced.
4. If the transmission shafts are satisfactory and are not going to be disassembled, apply engine oil to all components and reinstall them in the crankcase as described in this chapter.

Main Shaft Disassembly/Inspection/ Assembly

Refer to **Figure 120** for this procedure.
1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry.
2. Slide off the oil seal and the needle bearing assembly.
3. Slide off the thrust washer, the 2nd gear and the collar.
4. Remove the circlip.
5. Slide off the 3rd/4th combination gear.
6. Remove the circlip and splined washer.
7. Slide off the 5th gear.
8. Check each gear for excessive wear, burrs, pitting or chipped or missing teeth. Make sure the lugs on the gears are in good condition.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the countershaft even though it may not show as much wear or damage.

NOTE

The 1st gear is part of the shaft. If the gear is defective, the shaft must be replaced.

9. Make sure that all gears slide smoothly on the main shaft splines.

NOTE

It is a good idea to replace all circlips every other time the transmission is disassembled to ensure proper gear alignment.

10. Slide on the 5th gear and install the splined washer and circlip.
11. Slide on the 3rd/4th combination gear and install the circlip. Install the smaller diameter gear first.
12. Install the circlip and the collar.
13. Slide on the 2nd gear and the thrust washer.
14. Install the needle bearing assembly and the oil seal.

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are engaged into the groove in the raised splines of the transmission shaft.
12. Slide on the splined lockwasher so that the tangs go into the open areas of the splined washer and lock the washer in place.
13. Slide on the 3rd gear bushing and the 3rd gear (flush side on first).
14. Slide on the splined washer and circlip.
15. Slide on the 5th gear and thrust washer.
16. Slide on the 1st gear (flush side on last) and install the thrust washer.
17. Install the needle bearing assembly.

5-SPEED TRANSMISSION

Preliminary Inspection

Prior to disassembling the transmission shaft assemblies, they should be cleaned and inspected. Place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry. Repeat for the other shaft assembly.
1. After they have been cleaned, visually inspect the components of the assemblies for excessive wear. Any burrs, pitting or roughness on the teeth of a gear will cause wear on the mating gear. Minor roughness can be cleaned up with an oilstone but there's little point in wasting time attempting to remove deep scars.

NOTE

Defective gears should be replaced. It's a good idea to replace the mating gear on the other shaft even though it may not show as much wear or damage.

2. Carefully check the engagement dogs. If any are chipped, worn, rounded or missing, the affected gear must be replaced.
3. Rotate the transmission bearings in the crankcases by hand. Check for roughness, noise and radial play. Any bearing that is suspect should be replaced.
4. If the transmission shafts are satisfactory and are not going to be disassembled, apply engine oil to all components and reinstall them in the crankcase as described in this chapter.

Main Shaft Disassembly/Inspection/ Assembly

Refer to **Figure 120** for this procedure.
1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry.
2. Slide off the oil seal and the needle bearing assembly.
3. Slide off the thrust washer, the 2nd gear and the collar.
4. Remove the circlip.
5. Slide off the 3rd/4th combination gear.
6. Remove the circlip and splined washer.
7. Slide off the 5th gear.
8. Check each gear for excessive wear, burrs, pitting or chipped or missing teeth. Make sure the lugs on the gears are in good condition.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the countershaft even though it may not show as much wear or damage.

NOTE

The 1st gear is part of the shaft. If the gear is defective, the shaft must be replaced.

9. Make sure that all gears slide smoothly on the main shaft splines.

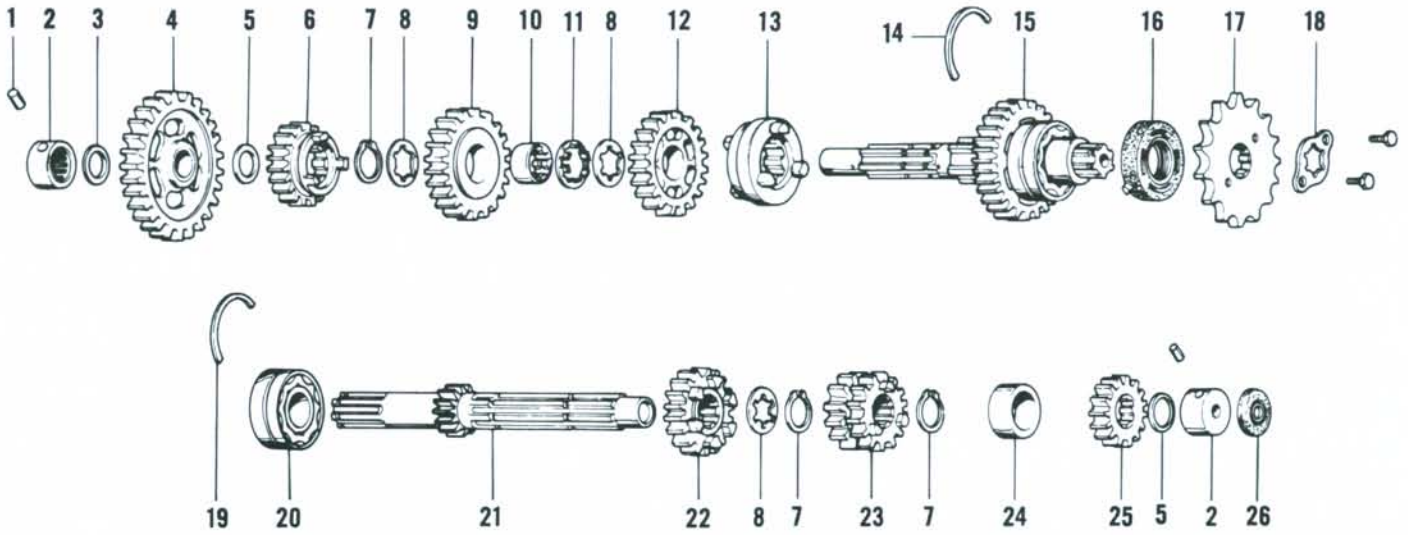
NOTE

It is a good idea to replace all circlips every other time the transmission is disassembled to ensure proper gear alignment.

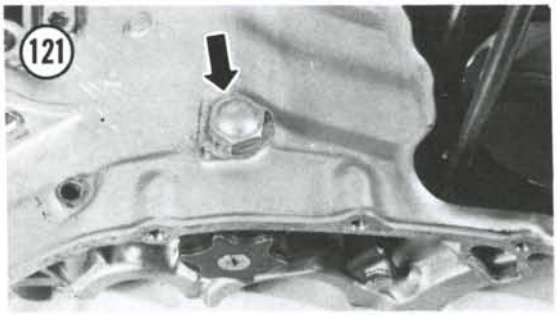
10. Slide on the 5th gear and install the splined washer and circlip.
11. Slide on the 3rd/4th combination gear and install the circlip. Install the smaller diameter gear first.
12. Install the circlip and the collar.
13. Slide on the 2nd gear and the thrust washer.
14. Install the needle bearing assembly and the oil seal.

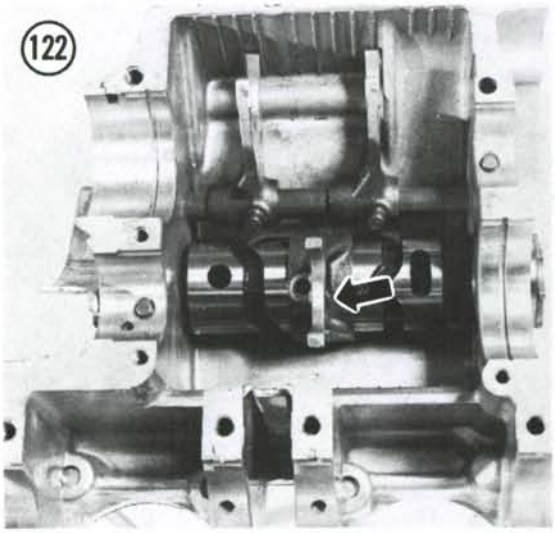
5-SPEED TRANSMISSION

(120)



1. Dowel pin
2. Needle bearing assembly
3. Thrust washer
4. Countershaft 1st gear
5. Thrust washer
6. Countershaft 5th gear
7. Circlip
8. Splined washer
9. Countershaft 3rd gear
10. Countershaft 3rd gear bushing
11. Splined lockwasher
12. Countershaft 4th gear
13. Countershaft shifter
14. 1/2 set ring
15. Countershaft/2nd gear
16. Oil seal
17. Drive sprocket
18. Drive sprocket holding plate
19. 1/2 set ring
20. Ball bearing
21. Main shaft/1st gear
22. Main shaft 5th gear
23. Main shaft 3rd/4th combination gear
24. Collar
25. Main shaft 2nd gear
26. Oil seal





Countershaft Disassembly/Inspection/ Assembly

Refer to **Figure 120** for this procedure.

1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry.
2. Remove the needle bearing assembly.
3. Slide off the thrust washer and the 1st gear.
4. Slide off the thrust washer and the 5th gear.
5. Remove the circlip and thrust washer and slide off the 3rd gear and the 3rd gear bushing.
6. Slide off the splined lockwasher. Rotate the splined washer in either direction to disengage the tangs from the raised splines on the transmission shaft. Slide off the splined washer.
7. Slide off the 4th gear and the countershaft shifter.
8. Check each gear for excessive wear, burrs, pitting or chipped or missing teeth. Make sure the lugs on the gears are in good condition.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the main shaft even though it may not show as much wear or damage. The 2nd gear is part of the shaft. If the gear is defective, the shaft must be replaced.

9. Make sure that all gears slide smoothly on the countershaft splines.

NOTE

It is a good idea to replace the circlip every other time the transmission is disassembled to ensure proper gear alignment.

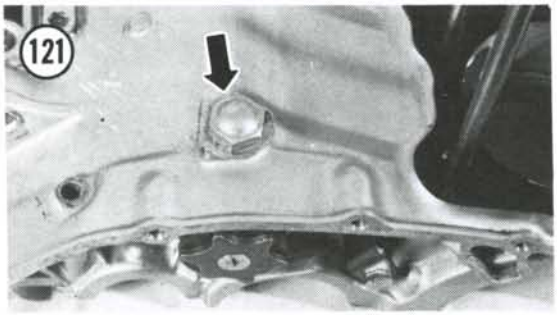
10. Slide on the countershaft shifter and the 4th gear.
11. Slide on the splined washer. Rotate the splined washer in either direction so its tangs are engaged into the groove in the raised splines of the transmission shaft.
12. Slide on the splined lockwasher so that the tangs go into the open areas of the splined washer and lock the washer in place.
13. Slide on the 3rd gear bushing and the 3rd gear (flush side on first).
14. Slide on the splined washer and circlip.
15. Slide on the 5th gear and thrust washer.
16. Slide on the 1st gear (flush side on last) and install the thrust washer.
17. Install the needle bearing assembly.

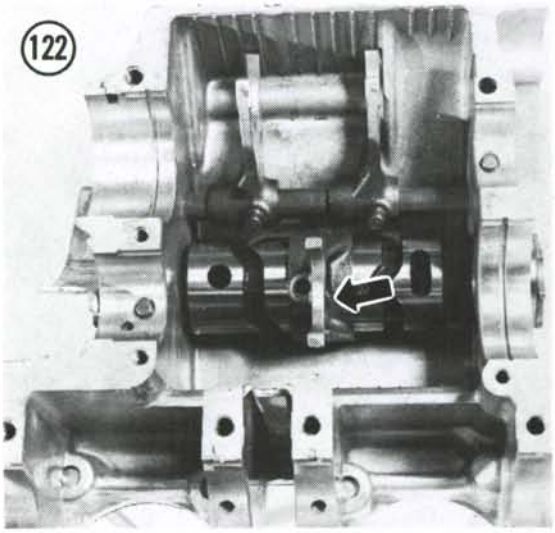
INTERNAL SHIFT MECHANISM

Removal/Installation

1. Split the crankcase and remove the transmission assemblies as described in this chapter.
2. Straighten the locking tab on the lockwasher and remove the shift drum retaining bolt, O-ring, spring and No. 10 steel ball (**Figure 121**).
3. Remove the center shift fork guide pin clip and guide pin (**Figure 122**).

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Countershaft Disassembly/Inspection/ Assembly

Refer to **Figure 120** for this procedure.

1. If not cleaned in the *Preliminary Inspection* sequence, place the assembled shaft into a large can or plastic bucket and thoroughly clean with solvent and a stiff brush. Dry with compressed air or let it sit on rags to drip dry.
2. Remove the needle bearing assembly.
3. Slide off the thrust washer and the 1st gear.
4. Slide off the thrust washer and the 5th gear.
5. Remove the circlip and thrust washer and slide off the 3rd gear and the 3rd gear bushing.
6. Slide off the splined lockwasher. Rotate the splined washer in either direction to disengage the tangs from the raised splines on the transmission shaft. Slide off the splined washer.
7. Slide off the 4th gear and the countershaft shifter.
8. Check each gear for excessive wear, burrs, pitting or chipped or missing teeth. Make sure the lugs on the gears are in good condition.

NOTE

Defective gears should be replaced. It is a good idea to replace the mating gear on the main shaft even though it may not show as much wear or damage. The 2nd gear is part of the shaft. If the gear is defective, the shaft must be replaced.

9. Make sure that all gears slide smoothly on the countershaft splines.

NOTE

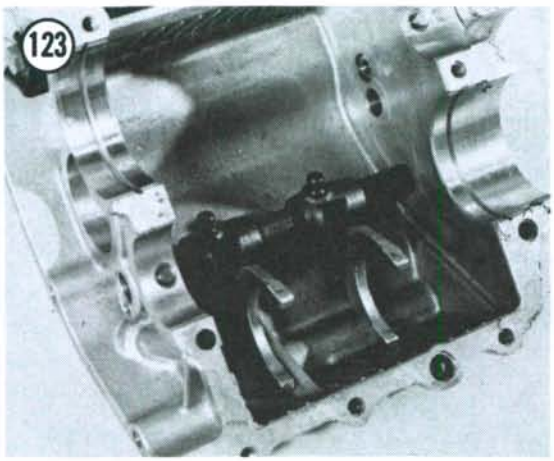
It is a good idea to replace the circlip every other time the transmission is disassembled to ensure proper gear alignment.

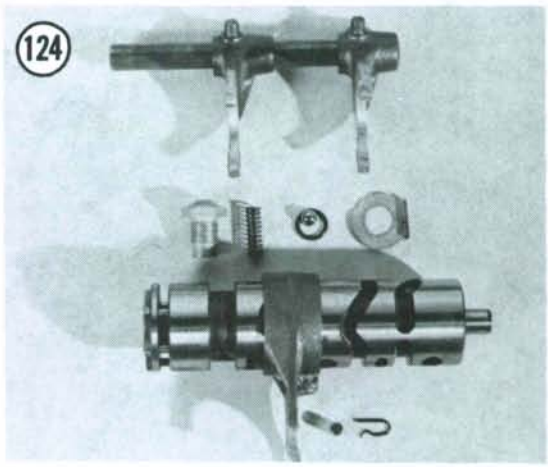
10. Slide on the countershaft shifter and the 4th gear.
11. Slide on the splined washer. Rotate the splined washer in either direction so its tangs are engaged into the groove in the raised splines of the transmission shaft.
12. Slide on the splined lockwasher so that the tangs go into the open areas of the splined washer and lock the washer in place.
13. Slide on the 3rd gear bushing and the 3rd gear (flush side on first).
14. Slide on the splined washer and circlip.
15. Slide on the 5th gear and thrust washer.
16. Slide on the 1st gear (flush side on last) and install the thrust washer.
17. Install the needle bearing assembly.

INTERNAL SHIFT MECHANISM

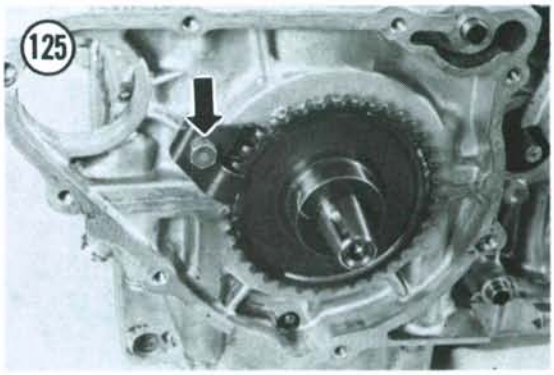
Removal/Installation

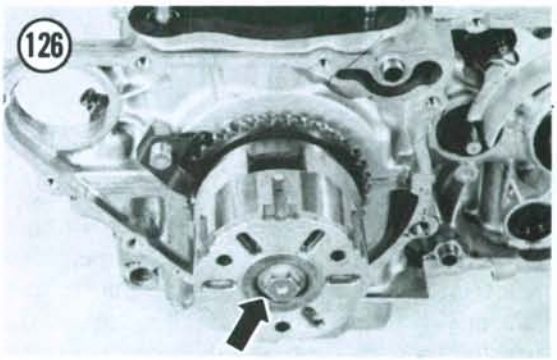
1. Split the crankcase and remove the transmission assemblies as described in this chapter.
2. Straighten the locking tab on the lockwasher and remove the shift drum retaining bolt, O-ring, spring and No. 10 steel ball (**Figure 121**).
3. Remove the center shift fork guide pin clip and guide pin (**Figure 122**).





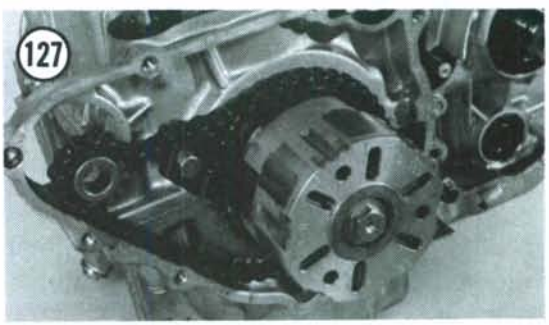
4. Partially withdraw the shift drum and slide off the shift fork from the shift drum. Remove the shift drum from the crankcase.
5. Partially withdraw the shift fork shaft and remove the shift forks from the shaft (**Figure 123**). Remove the shift fork shaft from the crankcase.
6. **Figure 124** shows the internal shift mechanism disassembled.
7. Install by reversing these removal steps, noting the following.
8. Be sure to install the shift forks onto the shift fork shaft as shown in **Figure 123**.
9. Be sure to install the center shift fork onto the shift drum as shown in **Figure 122**.
10. Position the shift drum in the NEUTRAL position. Install the No. 10 steel ball, spring, lockwasher, O-ring and shift drum retaining bolt. Tighten the bolt and bend up one side of the lockwasher against the side of the bolt head.



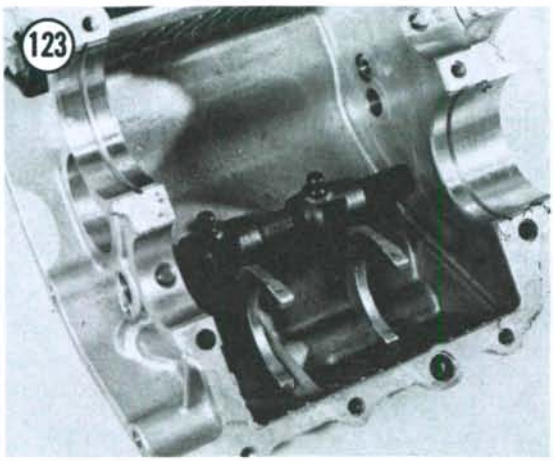


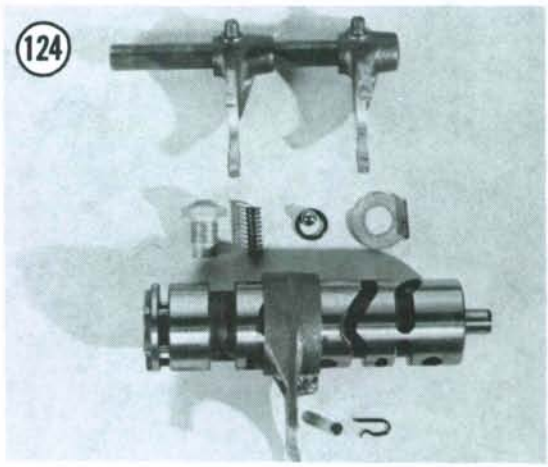
FINAL ENGINE REASSEMBLY

1. Install the starter sprocket and sprocket retaining plate and bolt (**Figure 125**).
2. Install the alternator rotor and retaining bolt (**Figure 126**). Tighten the bolt to 21.7-25.3 ft.-lb. (3.0-3.5 mkg).
3. Lay the starter chain and small sprocket in place (**Figure 127**).
4. Install the starter and mesh the small sprocket onto the starter shaft. Secure the starter with the mounting bolts (**Figure 128**).
5. Install a new gasket and the left-hand front crankcase cover (**Figure 129**).

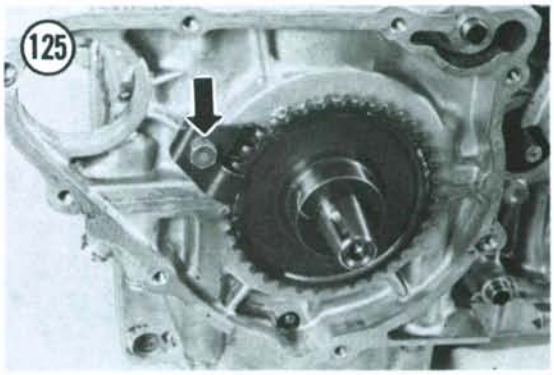


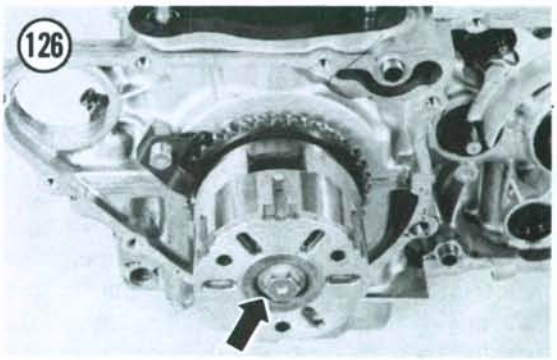
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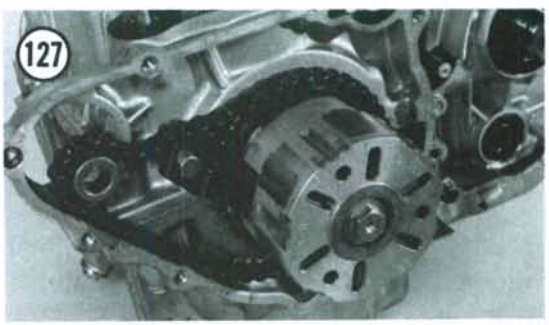
4. Partially withdraw the shift drum and slide off the shift fork from the shift drum. Remove the shift drum from the crankcase.
5. Partially withdraw the shift fork shaft and remove the shift forks from the shaft (**Figure 123**). Remove the shift fork shaft from the crankcase.
6. **Figure 124** shows the internal shift mechanism disassembled.
7. Install by reversing these removal steps, noting the following.
8. Be sure to install the shift forks onto the shift fork shaft as shown in **Figure 123**.
9. Be sure to install the center shift fork onto the shift drum as shown in **Figure 122**.
10. Position the shift drum in the NEUTRAL position. Install the No. 10 steel ball, spring, lockwasher, O-ring and shift drum retaining bolt. Tighten the bolt and bend up one side of the lockwasher against the side of the bolt head.

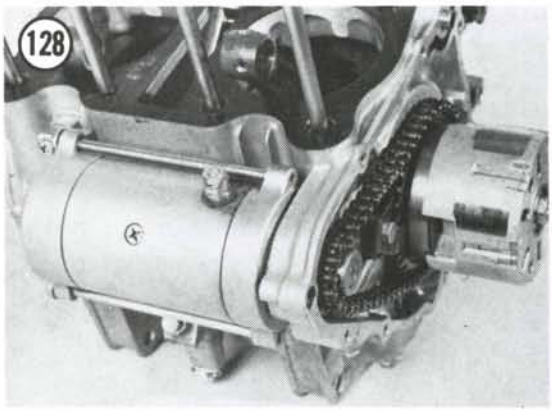


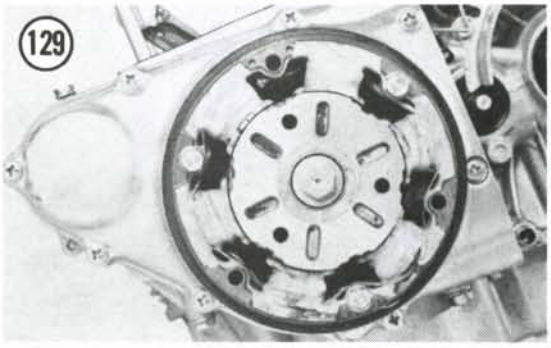


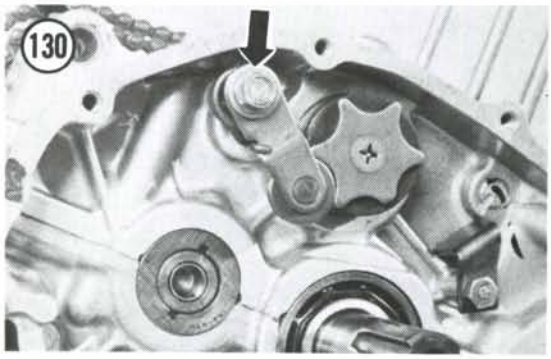
FINAL ENGINE REASSEMBLY

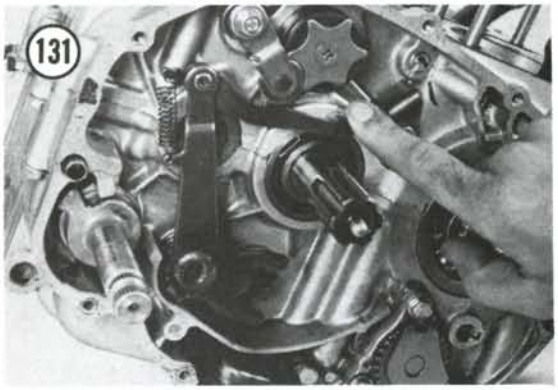
1. Install the starter sprocket and sprocket retaining plate and bolt (**Figure 125**).
2. Install the alternator rotor and retaining bolt (**Figure 126**). Tighten the bolt to 21.7-25.3 ft.-lb. (3.0-3.5 mkg).
3. Lay the starter chain and small sprocket in place (**Figure 127**).
4. Install the starter and mesh the small sprocket onto the starter shaft. Secure the starter with the mounting bolts (**Figure 128**).
5. Install a new gasket and the left-hand front crankcase cover (**Figure 129**).

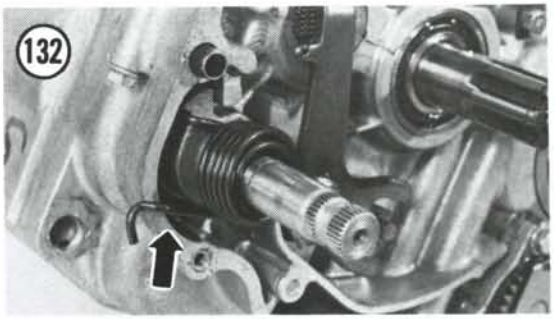


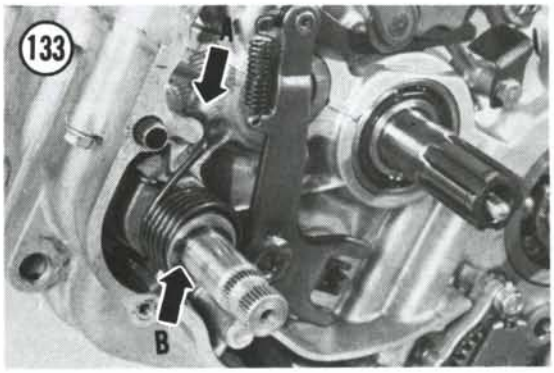


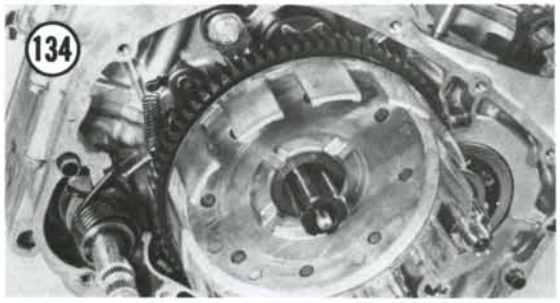












6. Install the shift cam stopper plate (**Figure 130**).
7. Install the shift spindle and shift arm (**Figure 131**).
8. Install the kickstarter return spring (**Figure 132**). Using a pair of Vise Grips, wind the spring clockwise and install the end onto the lug on the crankcase (A, **Figure 133**).
9. Install the washer and circlip (B, **Figure 133**).

CLUTCH AND EXTERNAL SHIFT MECHANISM

Installation

1. Install the primary drive gear and the clutch housing (**Figure 134**).

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2. Install the clutch hub, clutch pushrod and the clutch hub snap ring (**Figure 135**).
3. Install the push crown (**Figure 136**).

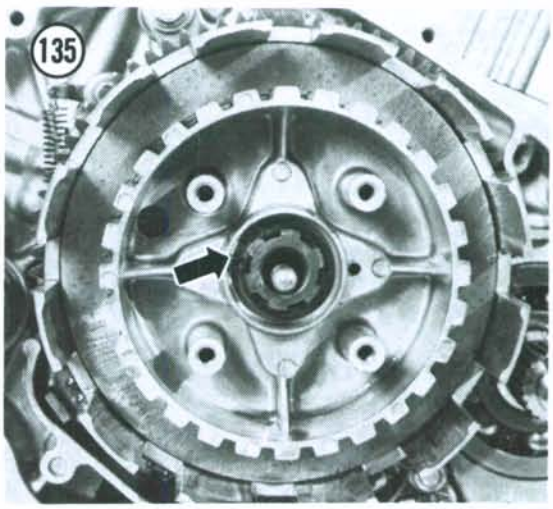
NOTE

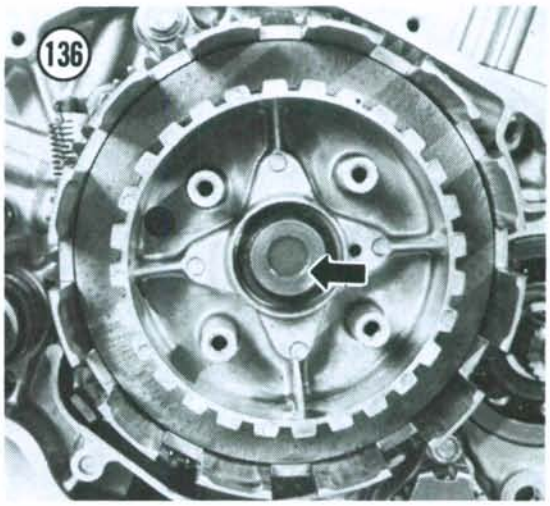
Make sure the push crown engages with the rounded end of the pushrod.

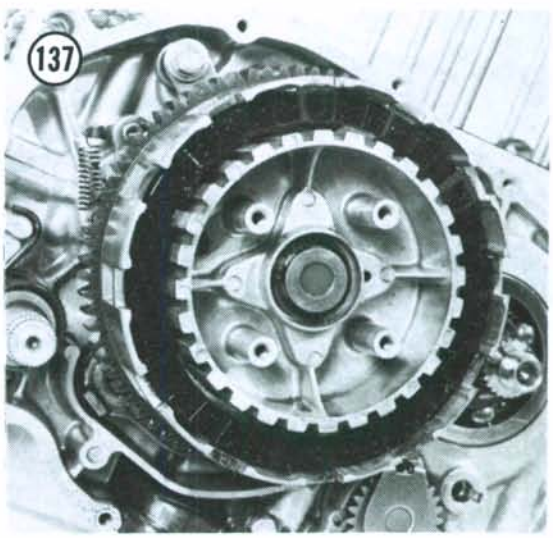
NOTE

If any of the friction plates or steel plates have been replaced with new ones, apply new engine oil to all surfaces to avoid having the clutch lock up when used for the first time.

4. Into the clutch housing install a friction plate, a steel plate, a friction plate, a steel plate and continue to alternate them until all items are installed. The last item to be installed is a friction plate (**Figure 137**).
5. Install the pressure plate, clutch springs and the hex bolts (**Figure 138**).
6. Place a shop rag or a copper penny between the gears to keep the clutch assembly from turning (**Figure 139**).
7. Tighten the bolts in a crisscross pattern in 2-3 stages. Remove the shop cloth or copper penny.
8. Install the oil filter housing and the dished washer with the "OUTSIDE" marking facing out. Install the lockwasher and the locknut with the chamfered side on first.
9. Use a special Honda tool (part No. 07916-2830000) and tighten the locknut to 32.6-39.7 ft.-lb. (4.5-5.5 mkg); refer to **Figure 140**.
10. Bend one of the lockwasher's locking tabs up into one of the slots in the locknut.
11. Install a new O-ring on the cap. Align one of the ribs on the oil filter cap with the index mark on the rotor. Install the cap and install the snap ring (**Figure 141**).
12. Install the oil pump idle gear (**Figure 142**).
13. Install the locating dowels, gasket and the right-hand crankcase cover (**Figure 143**).

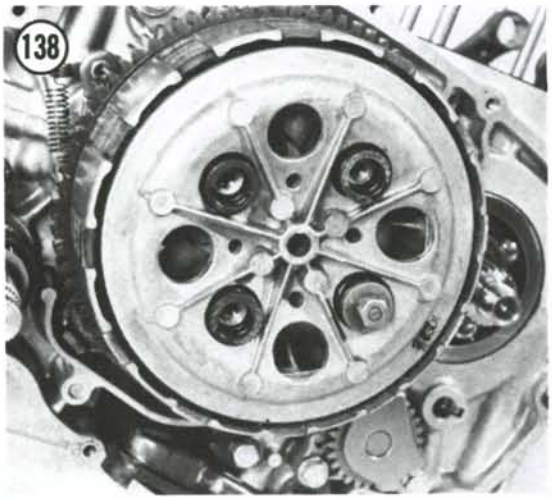


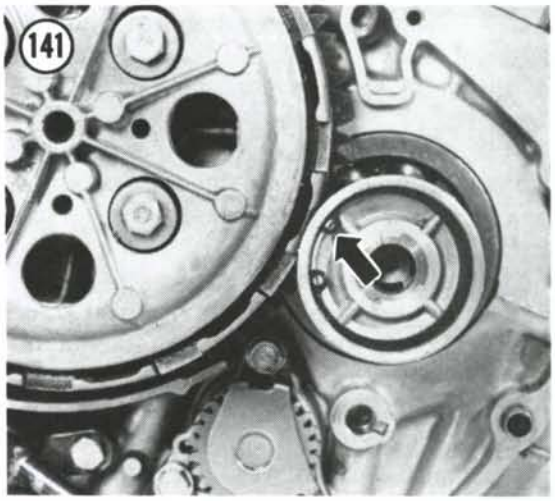


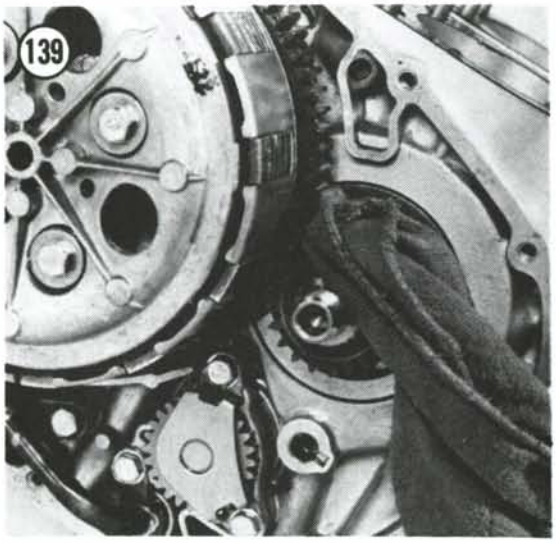


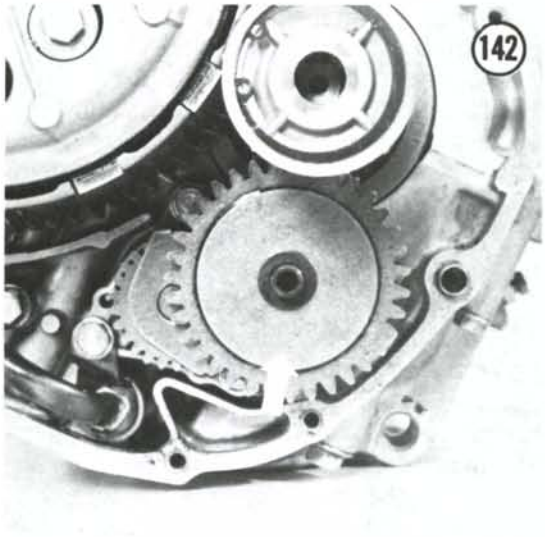
ENGINE INSTALLATION

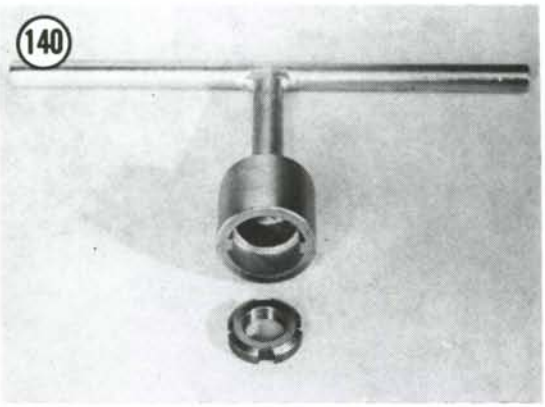
1. Set the engine into the frame.
2. Lift the engine to align the mounting holes and install the lower engine mounting bolts.

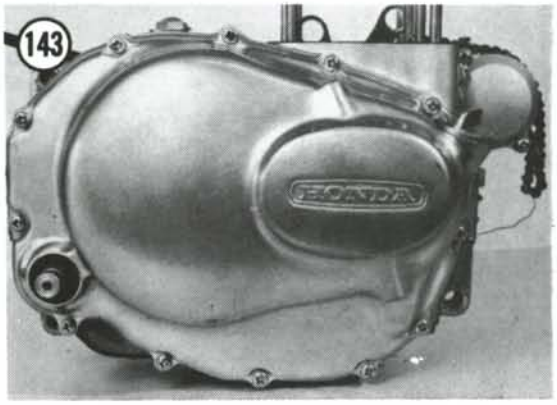

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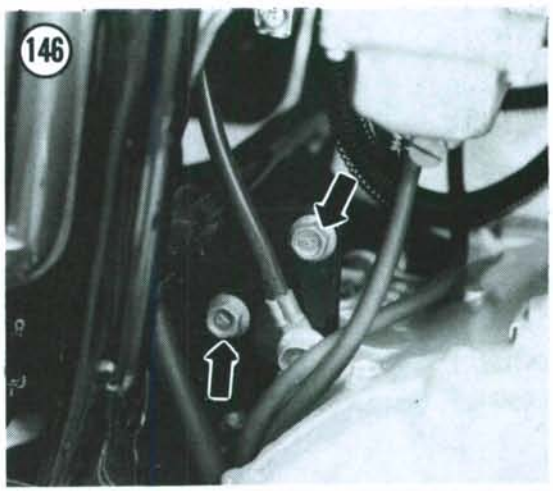

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HONDA

Refer to **Figure 144** for the front and to **Figure 145** for the rear.

3. Install the top rear mounting bolts (**Figure 146**).
4. Install the tachometer cable into the tachometer housing and tighten the set screw.
5. Connect the wiring harness to the frame with the frame clips.
6. Install the spark plug wires.
7. Connect the breaker point electrical wire.
8. Install the starter cable retaining clips (**Figure 147**).
9. Install the drive sprocket, sprocket retainer and the bolts (**Figure 148**).
10. Connect the starter cable (**Figure 149**).
11. Install the neutral light switch electrical wire (**Figure 150**).
12. Connect the electrical connector from the engine to the frame wiring harness.
13. Install the alternator cover.
14. Connect the clutch cable to the lifter mechanism in the left-hand rear crankcase cover and install the cover (**Figure 151**).
15. Install the thrust washer on the kickstarter shaft (**Figure 152**).
16. Install the kickstarter lever and tighten the bolt.
17. Install the footrests (**Figure 153**).
18. Install the carburetor assembly and tighten the retaining clamps (**Figure 154**) at the engine and the air cleaner side of the carburetors.
19. Install the air cleaner assembly.
20. Install the fuel tank.
21. Connect the battery negative cable.
22. Connect the fuel lines to the fuel petcock.
23. Install the engine oil drain plug and fill the engine with oil; refer to Chapter Three.

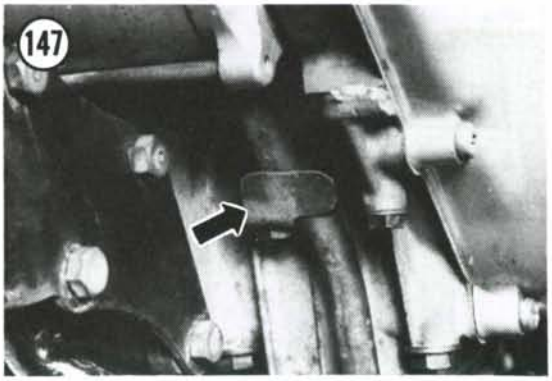


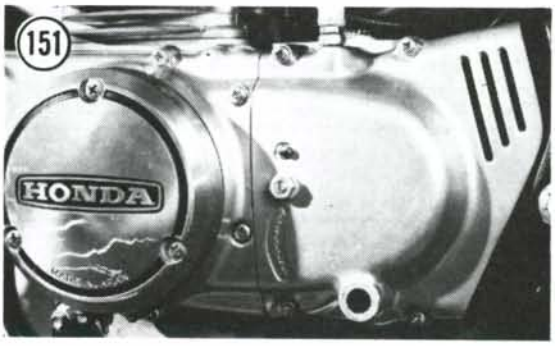


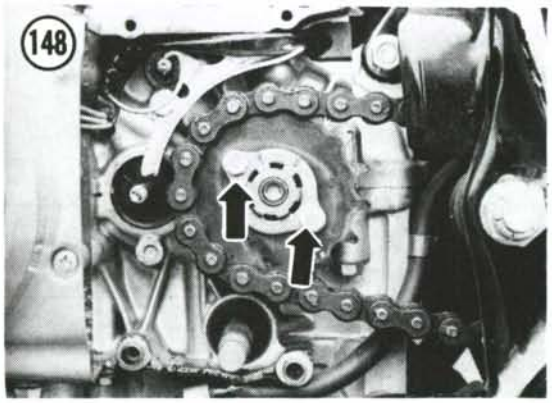


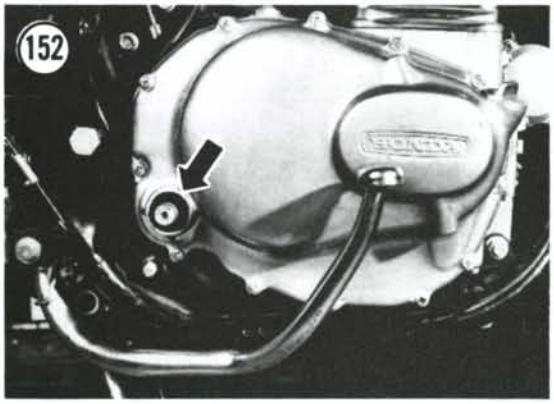
Final Checks

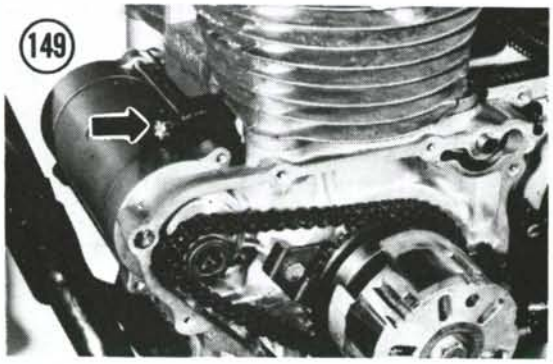
1. Check all engine mounting bolts for tightness.
2. Adjust the clutch, throttle cables, drive chain, ignition timing and valves. Refer to Chapter Three.
3. Make sure all nuts and bolts are tight.
4. Check all electrical wiring for chafing or binding after engine installation.
5. Start the engine and check for leaks.


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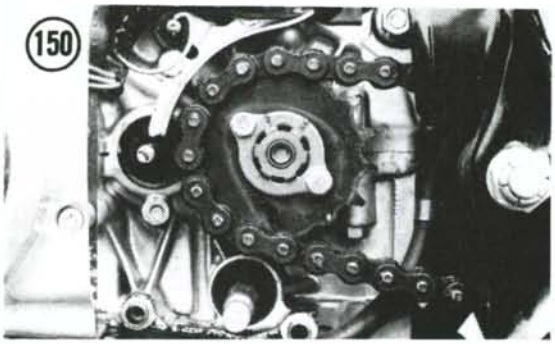

151
HONDA


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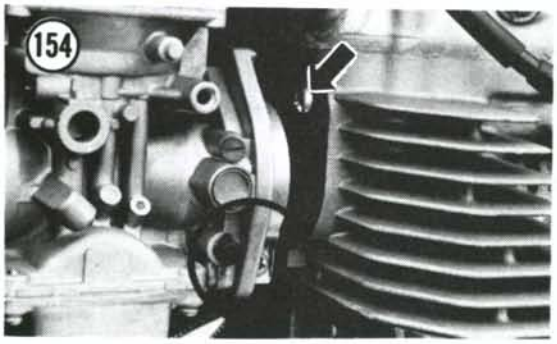

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Table 1 CLUTCH DISC SPECIFICATIONS

Model	Standard thickness	Wear limit
250 and 360	0.106 (2.7 mm)	0.0905 (2.3mm)

Table 2 CLUTCH SPRING SPECIFICATIONS

Model	Standard length		Service limit	
	in.	mm	in.	mm
250, 360	1.23	31.25	1.17	29.7

Table 3 VALVE STEM CLEARANCE

Model	Service Limit	
	in.	mm
250, 360		
Intake	0.0027	0.07
Exhaust	0.0035	0.09

Table 4 VALVE STEM SERVICE LIMITS

Model	in.	mm
250, 360		
Intake	0.2728	6.93
Exhaust	0.2728	6.93

Table 5 VALVE FACE WIDTH

Model	Standard	Service limit
250, 360		
Intake	0.039-0.051 in. (1.0-1.3 mm)	0.08 in. (2.0 mm)
Exhaust	0.039-0.051 in. (1.0-1.3 mm)	0.08 in. (2.0 mm)

Table 6 VALVE SPRING FREE LENGTH

Model	Service limit	
	in.	mm
250, 360		
Outer	1.88	47.8
Inner	1.57	39.3

Table 7 CYLINDER WEAR LIMITS

Model	in.	mm
250	2.209	56.1
360	2.642	67.1

Table 8 PISTON RING END GAP

Model	Standard value		Service limit	
	in.	mm	in.	mm
Top ring				
250	0.006	0.15	0.029	0.75
360	0.008-0.016	0.20-0.40	0.031	0.80
Second ring				
250, 360	0.006-0.014	0.15-0.35	0.030	0.75
Oil ring				
250, 360	0.008-0.016	0.20-0.40	0.031	0.80

Table 9 PISTON RING GROOVE CLEARANCE

Model	Standard value		Service limit	
	in.	mm	in.	mm
250				
Top	0.0008-0.0024	0.020-0.060	0.006	0.15
Second	0.0006-0.0018	0.015-0.045	0.006	0.15
Oil	0.0004-0.0018	0.010-0.045	0.006	0.15
360				
Top	0.0008-0.0024	0.020-0.060	0.006	0.15
Second	0.0008-0.0016	0.020-0.040	0.006	0.15
Oil	0.0004-0.0018	0.010-0.045	0.006	0.15

Table 10 PISTON CLEARANCE

Model	Standard value		Service limit	
	in.	mm	in.	mm
250, 360	0.0008-0.0020	0.020-0.050	0.008	0.20

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CHAPTER FIVE

FUEL AND EXHAUST SYSTEMS

For proper operation, a gasoline engine must be supplied with fuel and air mixed in proper proportions by weight. A mixture in which there is excess fuel is said to be rich. A lean mixture is one which contains insufficient fuel. It is the function of the carburetor to supply proper mixture to the engine under all operating conditions.

The Honda twins covered in this manual use vacuum piston carburetors (the slide position is controlled by engine vacuum).

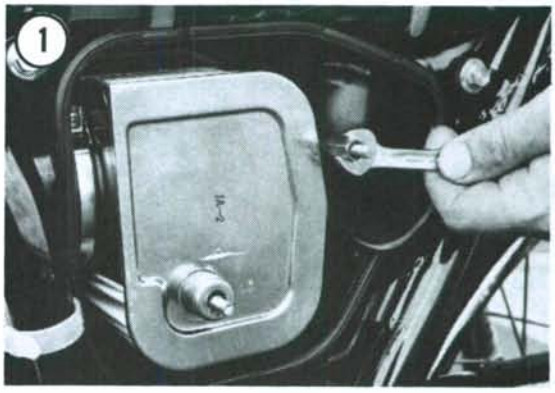
Tables 1-4 are at the end of the chapter.

CARBURETOR OVERHAUL

There is no set rule regarding frequency of carburetor overhaul. A carburetor used on a machine used primarily for street riding may go 5,000 miles without attention. If the machine is used in dirt, the carburetor might need an overhaul in less than 1,000 miles. Poor engine performance, hesitation and little or no response to idle mixture adjustment are all symptoms of possible carburetor malfunctions.

Removal/Installation

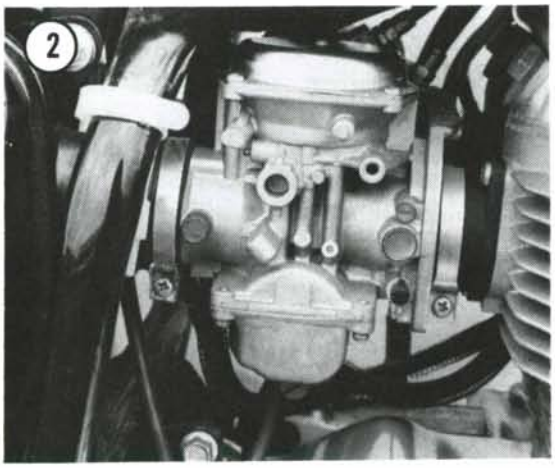
1. Remove the clamps and retaining nuts (**Figure 1**) and remove the air cleaner (one on each side).

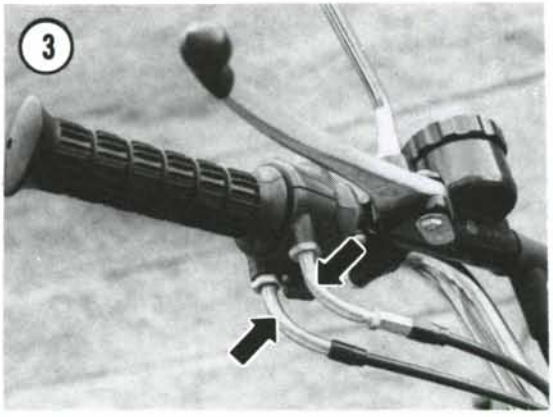


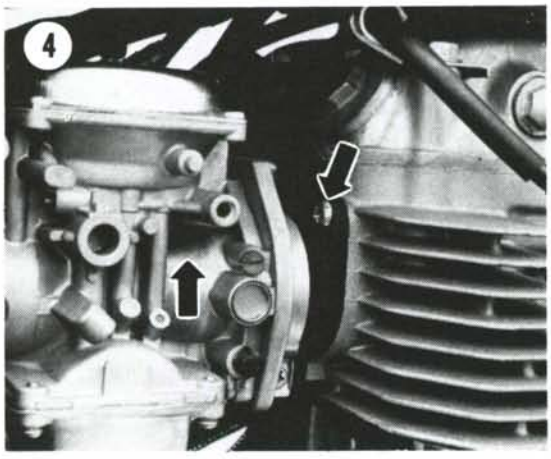
2. Loosen the clamping screws (**Figure 2**) and remove the clamp on all intake hoses.
3. Disconnect the throttle cables from the throttle grip (**Figure 3**).
4. Remove the carburetor assembly (**Figure 4**) and throttle cables from the engine.
5. Disconnect the throttle cables from the carburetor assembly.
6. Install by reversing these removal steps.

Disassembly/Assembly

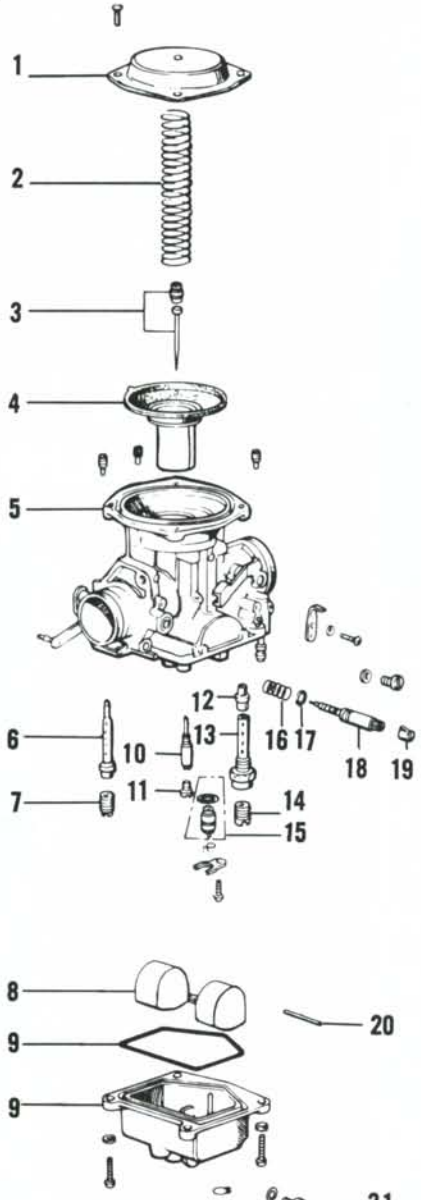
Refer to **Figure 5** for this procedure which is shown with one of the carburetors separated and removed from the mounting bracket for clarity. It is neither necessary nor







5 CARBURETOR ASSEMBLY



1. Diaphragm cover
2. Return spring
3. Jet needle
4. Diaphragm/slide
5. Carburetor body
6. Main nozzle
7. Primary main jet
8. Float
9. Float bowl and gasket
10. Slow jet
11. Slow jet plug
12. Jet needle
13. Jet needle holder
14. Main jet
15. Float valve set
16. Spring
17. O-ring
18. Idle mixture screw
19. Cover
20. Float pivot pin
21. Drain plug

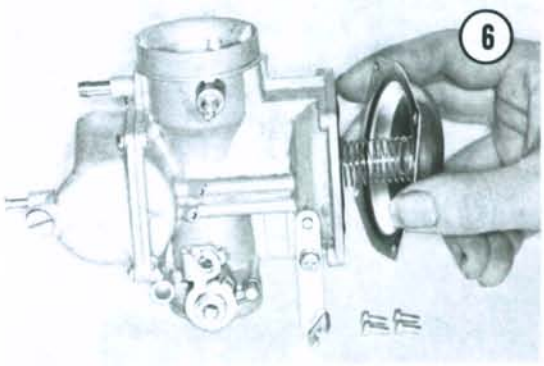
recommended to separate the carburetors to perform this procedure.

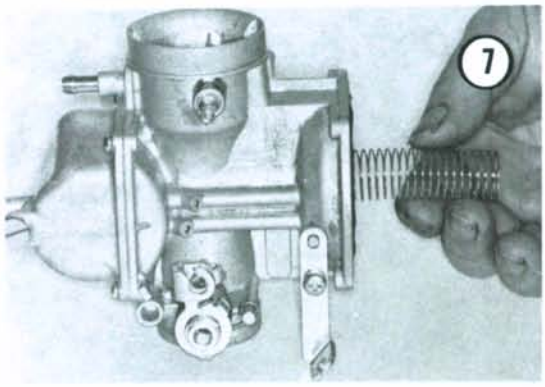
1. Remove 4 retaining screws, then pull off the diaphragm cover (**Figure 6**).
2. Pull out diaphragm return spring (**Figure 7**).
3. Pull out diaphragm and slide as an assembly (**Figure 8**). Note the locating tab on the diaphragm near the throttle cable bracket.
4. Remove the 4 screws, then the float bowl (**Figure 9**).
5. Pull out the main jet and pilot jet together by pulling on their retainer (**Figure 10**). Although these 2 jets appear to be similar, they may be distinguished by size; the main jet is larger. Always replace O-rings upon reassembly.
6. Remove the float assembly by pulling out its pivot shaft (**Figure 11**).
7. Remove the float needle (**Figure 12**).
8. Using needle nose pliers with *taped* jaws, pull out the float needle valve seat, after first removing its retaining clip (**Figure 13**).
9. Push out the needle jet and slow speed jet, using a fiber or plastic tool (**Figure 14**).
10. Remove the idle mixture screw and its spring (**Figure 15**).
11. Remove the drain plug (**Figure 16**).
12. The slide and diaphragm assembly may be disassembled by compressing the jet needle retaining clip with a pair of long nose pliers.
13. Reverse the preceding steps to reassemble the carburetor. Always use new gaskets and O-rings upon reassembly. Be sure to check float level before returning carburetor to service. Refer to *Carburetor Adjustment.*

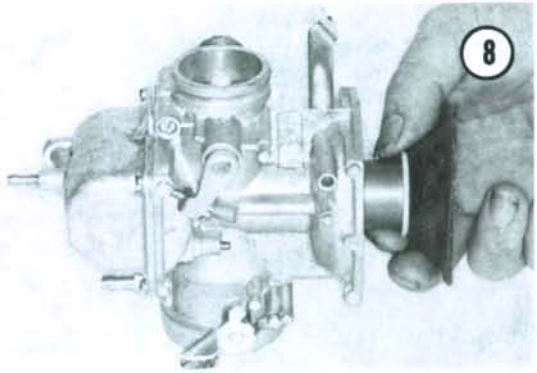
CARBURETOR ADJUSTMENT

The carburetor was designed to provide the proper mixture under all operating conditions. Little or no benefit will result from experimentation. However, unusual conditions such as sustained operation at high altitudes or unusually high or low temperatures may make modifications to standard specifications desirable. The adjustments described in the following paragraphs should only be undertaken if the rider has definite reason to believe they are required. Make the tests and adjustments in the order specified. Float level should be checked each time the carburetor is disassembled and adjusted if necessary.

A summary of carburetor adjustments is given in **Table 1**.







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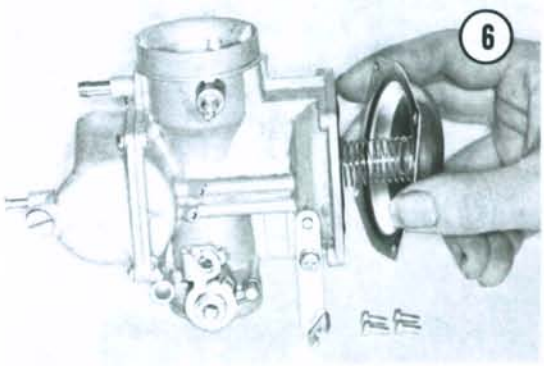
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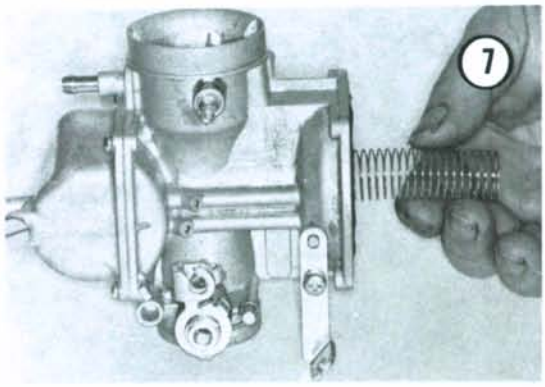
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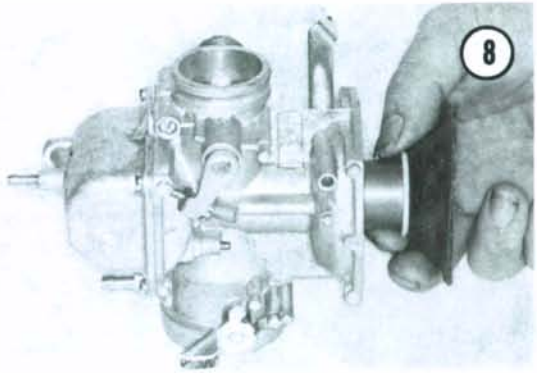
CARBURETOR ADJUSTMENT

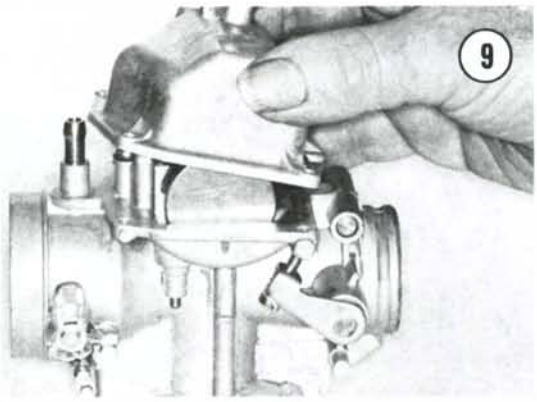
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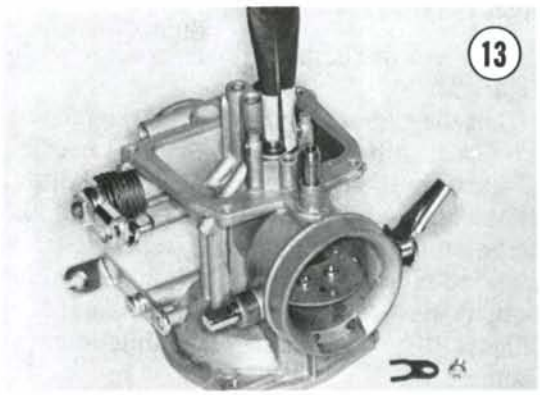
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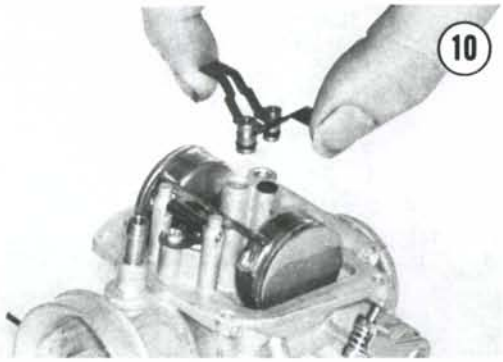


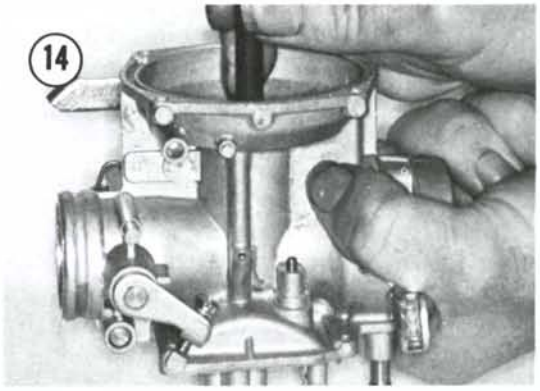


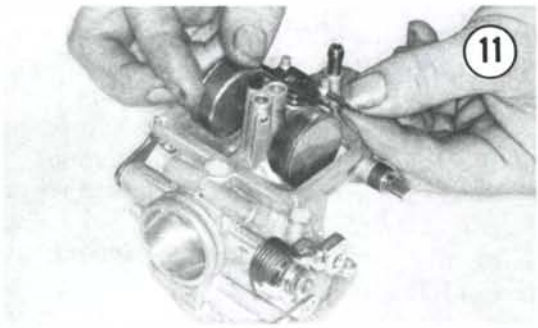


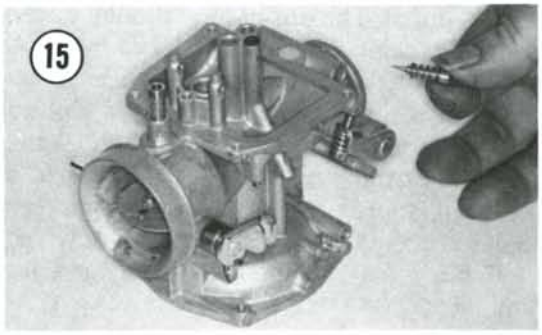

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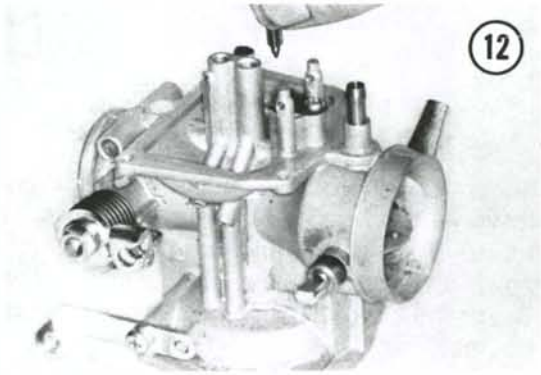

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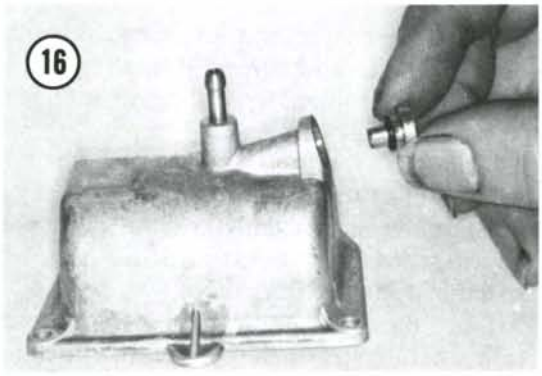

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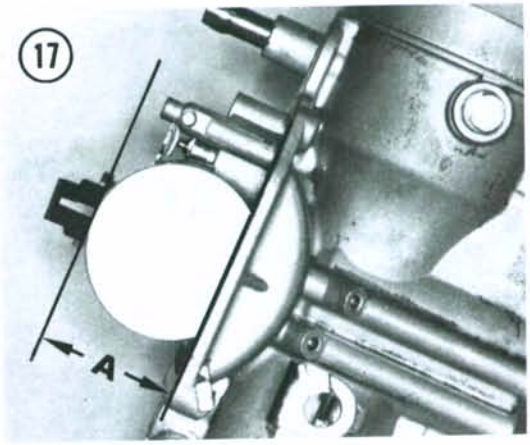

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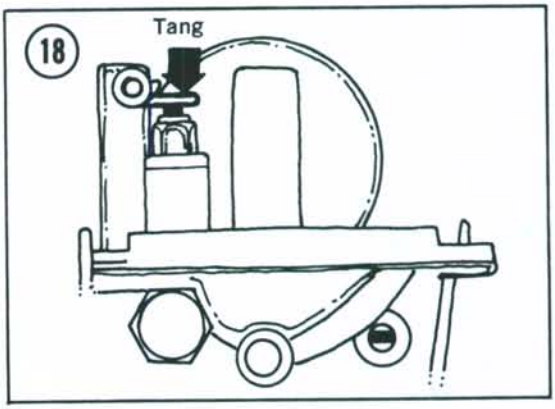

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Float Level

To check carburetor float level, refer to **Figure 17**.

1. Tilt the carburetor slowly until the tang on the float just barely touches the float needle.
2. Measure the distance between the bottom of the float and the bottom surface of the carburetor body (**Figure 17**). This distance must be as specified in **Table 2**, and equal for both floats. Bend the tang on the float arm (**Figure 18**) as necessary if adjustment is required.





Jet Size

Make a road test at full throttle for final determination of main jet size. To make such a test, operate the motorcycle at full throttle for at least two minutes, then shut the engine off, release the clutch and bring the machine to a stop.

If the engine runs heavily at full throttle, the main jet is too large. If the engine runs better by closing the throttle slightly, the main jet is too small. The engine will run at full throttle evenly and regularly if the main jet is of the correct size.

After each test, remove and examine the spark plugs. The insulators should have a light tan color. If the insulators have black sooty deposits, the mixture is too rich. If there are signs of intense heat, such as a blistered white appearance, the mixture is too lean.

As a general rule, main jet size should be reduced approximately 5 percent for each 3,000 feet (1,000 meters) above sea level.

Table 3 lists symptoms of rich and lean mixtures.

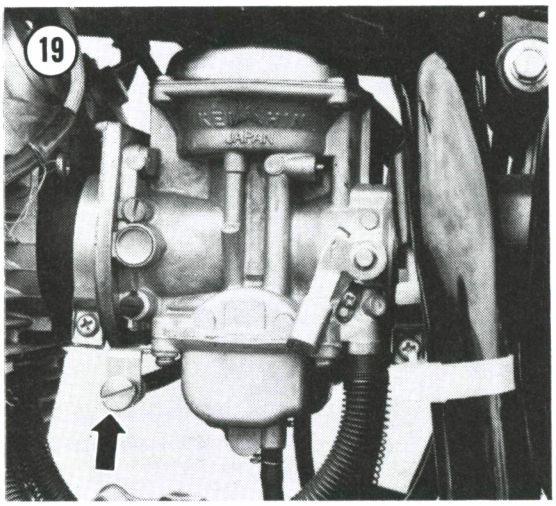
Idle Adjustment

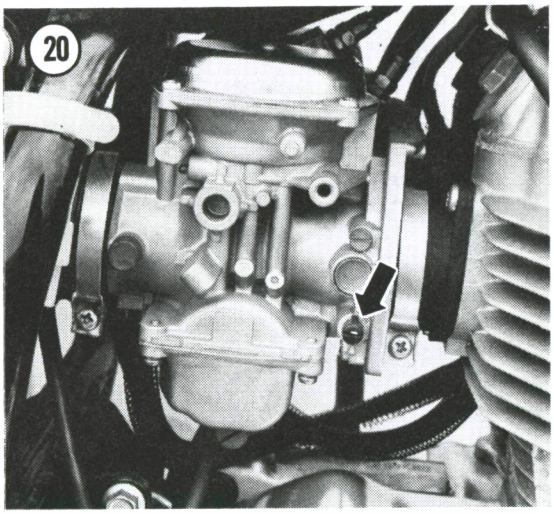
1. Start the engine and let it reach normal operating temperature. Usually 10-15 minutes of stop-and-go riding is sufficient. Turn the engine off.
2. Connect a portable tachometer following the manufacturer's instructions.
3. Start the engine and turn the idle speed adjust screw (**Figure 19**) to achieve an idle speed of 1,200 ± 100 rpm.
4. Turn the right-hand carburetor pilot screw (idle mixture screw) slowly in either direction until the engine idle speed is at its maximum (**Figure 20**).
5. Turn the left-hand carburetor pilot screw (idle mixture screw) slowly in either direction until engine idle speed is at its maximum.
6. Readjust the engine idle speed then repeat Step 3.
7. If, after performing this adjustment, the proper idle speed cannot be achieved or if the exhaust back pressures from both mufflers are not uniform (**Figure 21**), the carburetors must be synchronized as described in Chapter Three.

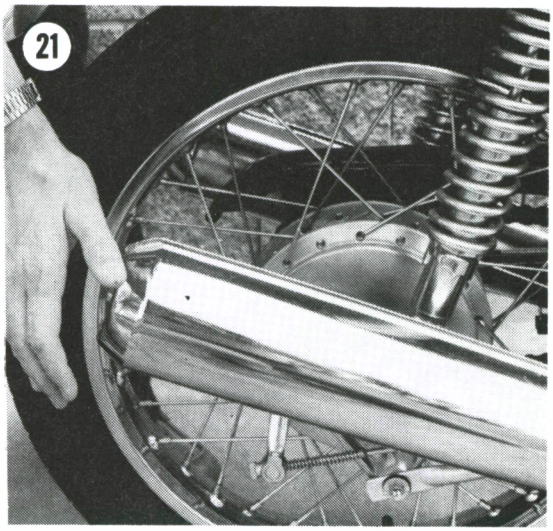
MISCELLANEOUS CARBURETOR PROBLEMS

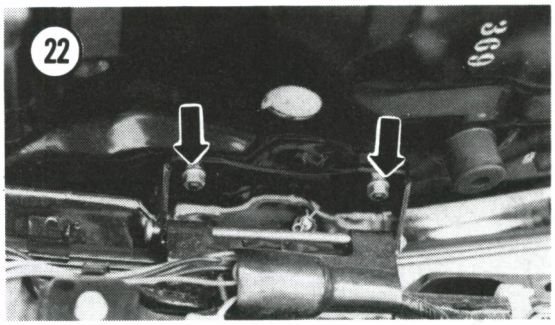
Careless washing of the motorcycle can leave water in the carburetor float bowls. To remedy this, remove and clean the carburetor bowl, main jet and any other affected parts. Be sure to cover the air intake when washing the machine.

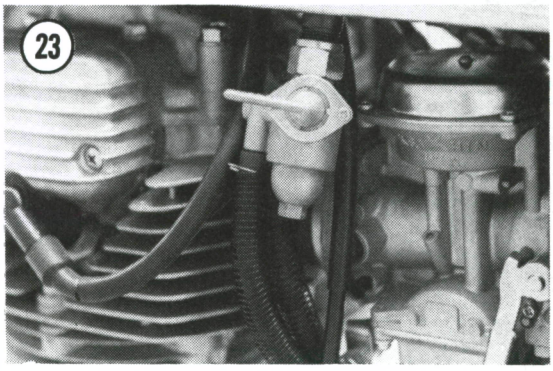
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If gasoline leaks past the float bowl gasket, high-speed fuel starvation may occur. Varnish deposits on the outside of the float bowl are evidence of this condition.

Dirt in the fuel may lodge in the float valve and cause an overrich mixture. As a temporary measure, tap the carburetor lightly with any convenient tool to dislodge the dirt. Later, clean the fuel tank, petcock, fuel line and carburetor at the first opportunity.

CARBURETOR SPECIFICATIONS

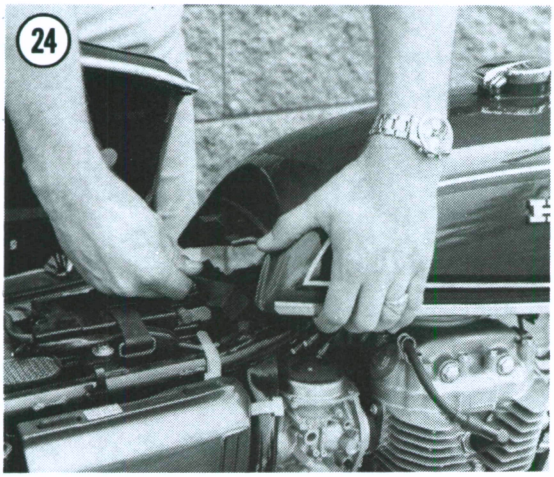
Table 4 lists major specifications of carburetors of the more popular bikes covered by this manual. These specifications have been determined by exhaustive factory tests and should not be changed unless there is good reason for doing so.

FUEL TANK

Removal/Installation

1. Loosen seat mounting bolts, then remove the seat (**Figure 22**).
2. Be sure that the fuel flow is shut off at the petcock, then remove fuel line(s) at petcock (**Figure 23**).

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3. Detach fuel tank from its rear rubber mount; lift it upward and to the rear. Be sure that no wires catch on the tank as it is removed (**Figure 24**).
4. Reverse preceding steps to install the fuel tank.

Inspection

1. Be sure that the filler cap vent is not clogged.
2. Check all rubber mounts and replace them if they are damaged.
3. Check fuel lines for leaks, hardening or cracks.
4. Check for sediment in the tank and flush out if necessary.

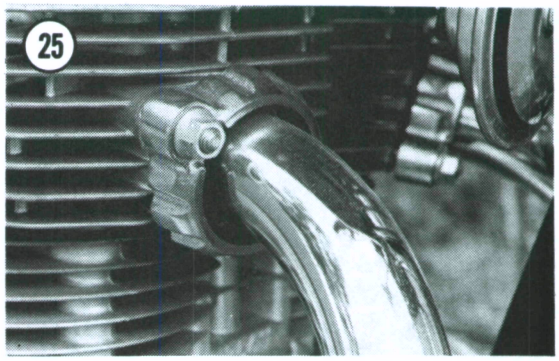
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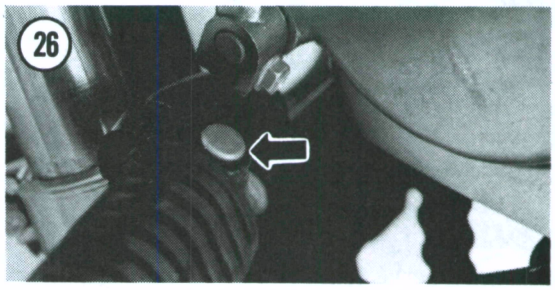
Open flames, cigarettes, water heater, clothes dryer pilot lights or electrical sparks may trigger a fatal explosion. Do not work on any fuel system component within 50 feet of any possible source of ignition.

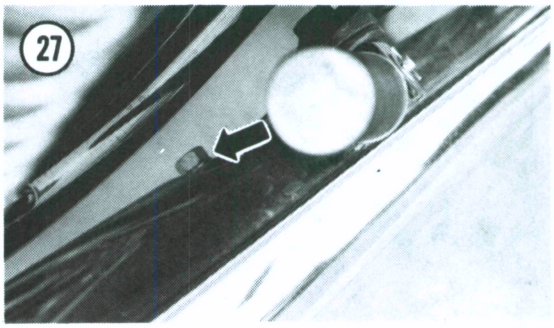
Fuel Strainer Service

The fuel strainer filters out particles which might otherwise get into a carburetor and cause the float needle valve to remain open, resulting in flooding. Such particles might also get into the engine and cause damage.

Remove the fuel strainer located at the fuel petcock (**Figure 23**), clean it in solvent, then blow dry with compressed air. Be sure that all gaskets are in good condition upon reassembly.







EXHAUST SYSTEM

Removal/Installation

1. Remove nuts at each cylinder head (**Figure 25**).
2. Remove footpegs and footrest bar if necessary (**Figure 26**).
3. Remove rear attachment bolts (**Figure 27**).
4. Reverse preceding steps to install the exhaust system.

Inspection

1. Check gaskets and rubber cushions for cracks or damage.
2. Pull out baffle tubes (if so equipped) and remove carbon deposits.

Table 1 CARBURETOR ADJUSTMENT SUMMARY

Throttle Opening	Adjustment	If too Rich	It too Lean
0 - 1/8	Air screw	Turn out	Turn in
1/8 - 1/4	Throttle valve cutaway	Use larger cutaway	Use smaller cutway
1/4 - 3/4	Jet needle	Raise clip	Lower clip
3/4 - full	Main jet	Use smaller number	Use larger number

Table 2 CARBURETOR FLOAT HEIGHT

Model	in.	mm
250, 360	0.75	18.5

Table 3 POOR MIXTURE SYMPTOMS

Condition	Symptom	Condition	Symptom
Rich mixture	Rough idle Black exhaust smoke Hard starting, especially when hot Black deposits in exhaust pipes Gas-fouled spark plugs Poor gas mileage Engine performs worse as it warms up	Lean mixture	Backfiring Rough idle Overheating Hesitation upon acceleration Engine speed varies at fixed throttle Loss of power Poor accelaration

Table 4 CARBURETOR JETS

Model	Pilot jet	Main jet	
		Primary	Secondary
CB250GS	35	68	95
CJ250T	35	68	95
CB360	35	68	*
CJ360T, CJ360G	35	68	110
CL360	35	68	*

*#100 for carburetor models 745A, 745B, 747A, 750A
#110 for carburetor models 754A

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CHAPTER SIX

ELECTRICAL SYSTEMS

This chapter covers operating principles and removal and installation procedures for Honda ignition and electrical systems. Refer to Chapter Two for troubleshooting and Chapter Three for tune-up procedures.

Tables 1-3 are at the end of this chapter.

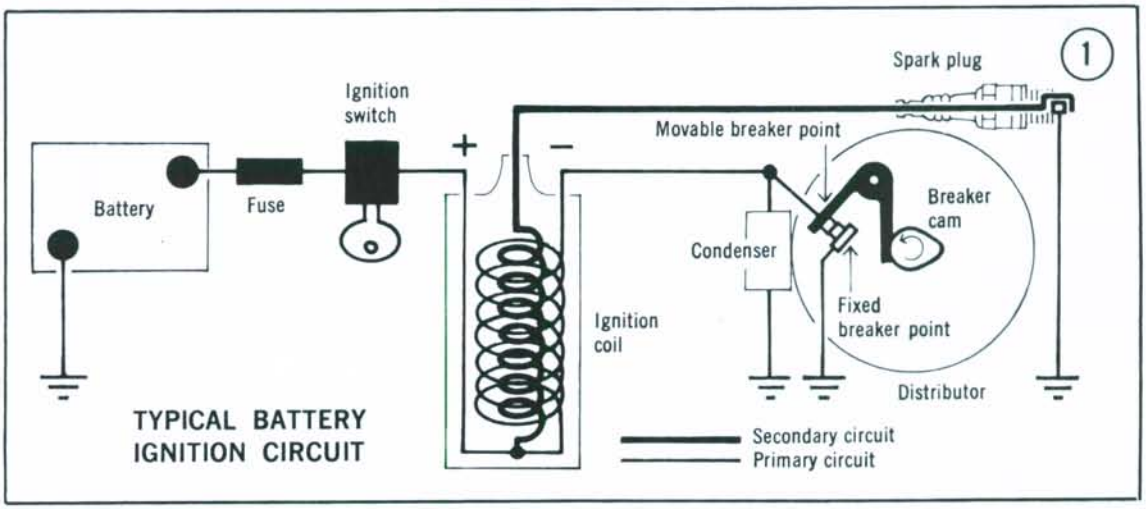
IGNITION SYSTEM

Honda twin-cylinder models are equipped with a battery and coil ignition system.

Circuit Operation

Figure 1 illustrates a typical battery ignition system for a single cylinder. When the breaker points are closed, current flows from the battery through the primary windings of the igntion coil thereby building a magnetic field around the coil. The breaker cam rotates at one-half crankshaft speed and is so adjusted that the breaker points open as the piston reaches the firing position.

As the points open, the magnetic field collapses and a very high voltage is induced of



TYPICAL BATTERY IGNITION CIRCUIT

up to approximately 15,000 volts in the secondary winding of the ignition coil. This high voltage is sufficient to jump the gap at the spark plug.

The condenser assists the coil in developing high voltage and also protects the points. Inductance of the ignition coil primary winding tends to keep a surge of current flowing through the circuit even after the points have started to open. The condenser stores this surge and thus prevents arcing at the points. This circuit is duplicated for each cylinder.

Service

There are two major items requiring service on battery ignition models: breaker point service and ignition timing. Both are vitally important to proper engine operation and reliability. Refer to Chapter Three, *Breaker Points* and *Ignition Timing* sections.

Ignition System Problems

Ignition system problems can be classified as no spark, weak spark or improperly timed spark. **Table 1** lists common causes and remedies for ignition system malfunctions.

Disconnect the condenser and the wire from the points. Connect the ungrounded (positive) voltmeter lead to the wire which was connected to the points. If the voltmeter does not indicate battery voltage, the problem is an open coil primary circuit. Replace the suspected coil with a known good one. If the coil does not work, the problem is in the primary winding.

If the voltmeter indicates battery voltage, the coil primary ciruit is okay. Connect the positive voltmeter lead to the wire which goes from the coil to the points. Block the points open with a business card or similar piece of cardboard. Connect the negative voltmeter lead to the movable point. If the voltmeter indicates any voltage, the points are shorted and must be replaced.

If the foregoing checks are satisfactory, the problem is in the coil or condenser. Substitute each of these separately with a known good one to determine which is defective.

Ignition Coil

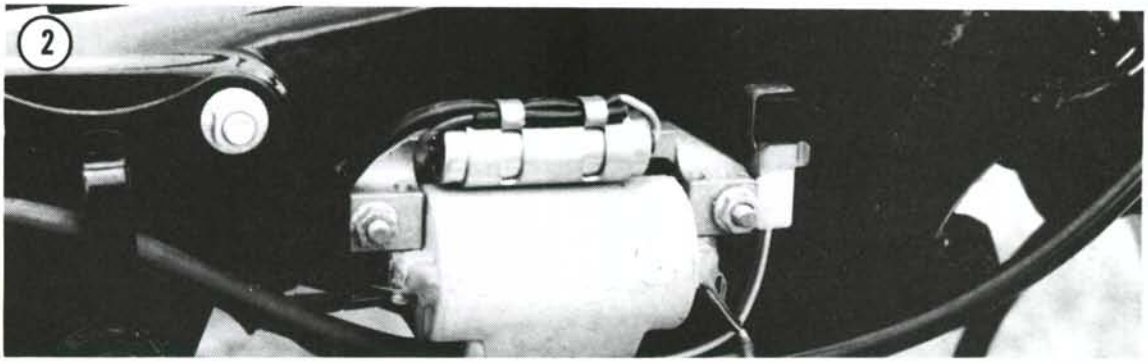
The ignition coil (**Figure 2**) is a form of transformer which develops the high voltage required to jump the spark plug gap. The only maintenance required is that of keeping the electrical connections clean and tight and occasionally checking to see that the coil is mounted securely.

If the condition of the coil is doubtful, there are several checks which should be made.

1. Measure resistance between both primary terminals of the suspected coil. Resistance should be approximately 3-5 ohms.
2. Measure secondary coil resistance between either primary lead and the secondary lead of the suspected coil. Resistance should be approximately 10,000 ohms.
3. Set the meter on the hightest ohmmeter range. Determine that there is no continuity between the high voltage lead and coil frame.

Condenser

The condenser is a sealed unit that requires no maintenance. Be sure that both connections are clean and tight.



Two tests can be made on the condenser. Measure condenser capacity with a condenser tester. Capacity should be about 0.2-0.3 microfarad. The other test is insulation resistance, measured between the condenser pigtail and case, which should not be less than 5 megohms.

In the event that no test equipment is available, a quick test of the condenser may be made by connecting the condenser case to the negative terminal of the motorcycle battery and the positive lead to the positive battery terminal. Allow the condenser to charge for a few seconds, then quickly disconnect the battery and touch the condenser pigtail to the condenser case. If you observe a spark as the pigtail touches the case, you may assume that the condenser is okay.

Arcing between the breaker points is a common symptom of condenser failure.

CHARGING SYSTEM

The charging system (**Figure 3**) on all Honda twins covered by this manual consists of an alternator, battery and interconnecting wiring. Some models are also equipped with a solid state voltage regulator.

Alternator

An alternator is a form of electrical generator in which a magnetized field rotor revolves within a set of stationary coils called a stator. As the rotor revolves, alternating current is induced in the stator. Stator current is then rectified and used to operate electrical accessories on the motorcycle and for battery charging.

If alternator or regulator problems are suspected, as in the case of a chronically undercharged battery or dim headlights, first check the battery. Refer to *Battery Service*. It must be in good condition and at least half charged (1.220 specific gravity) before meaningful interpretation of test results can be made.

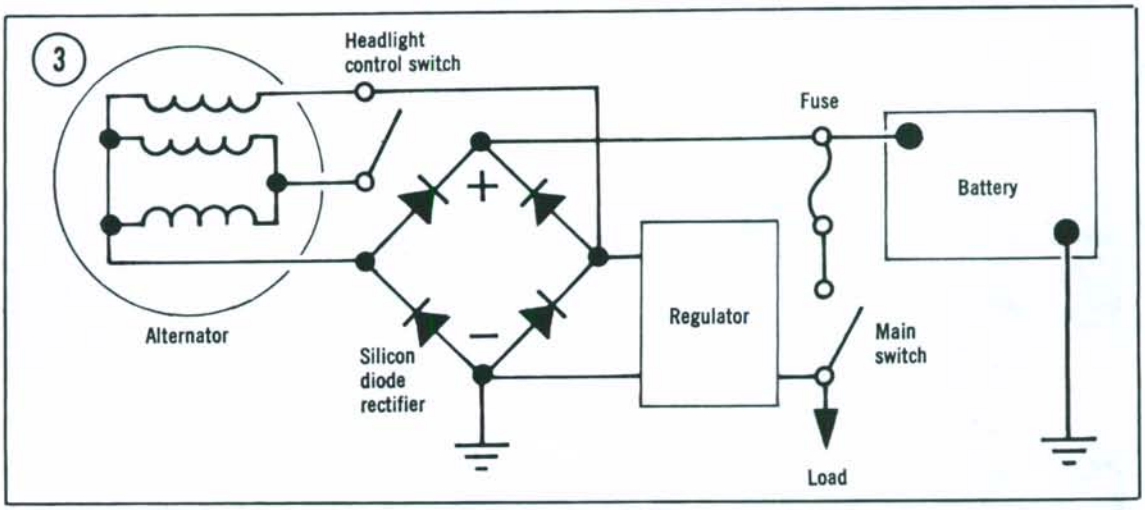
Connect 0-15 DC voltmeter and 0-10 DC ammeter as shown in **Figure 4**. Connect the positive ammeter terminal to the battery charging wire from the rectifier and the negative ammeter terminal to the positive battery terminal. Connect the voltmeter positive lead to the battery charging lead and the negative terminal to a good ground.

CAUTION

If the ammeter is connected between the battery positive terminal and the starter cable, do not attempt to start the engine with the electric starter. Starter current will burn out the ammeter.

Start the engine and run it at the speeds listed in **Table 2**. Observe the voltmeter and ammeter and compare their indications with the specifications. All measurements are made with lights on.

If charging current was considerably lower than specified, check the alternator and



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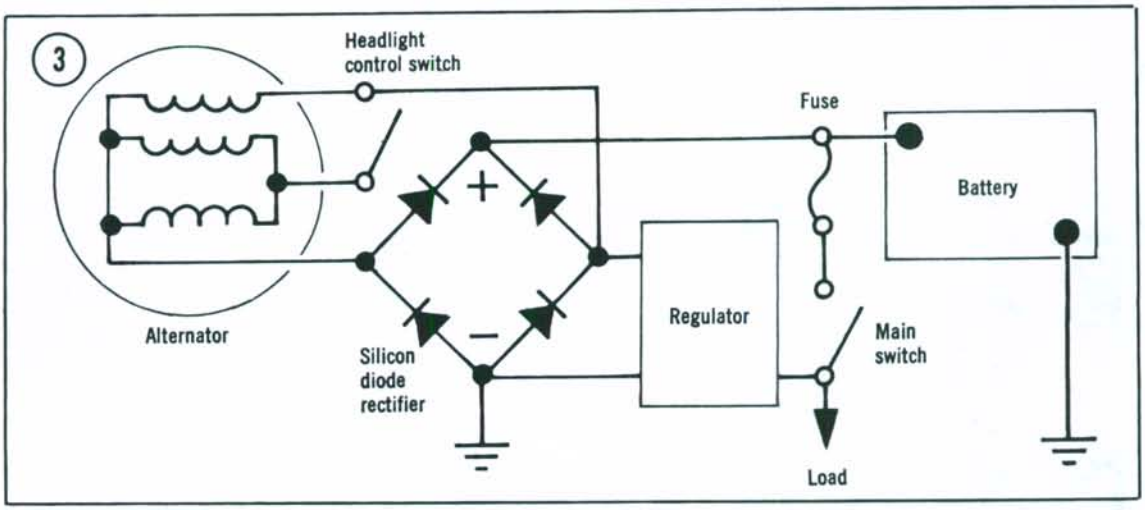
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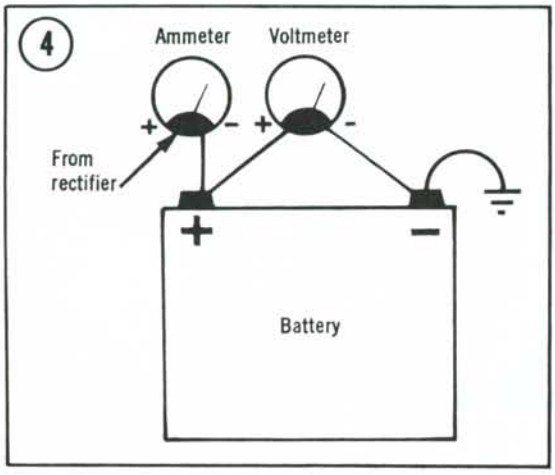
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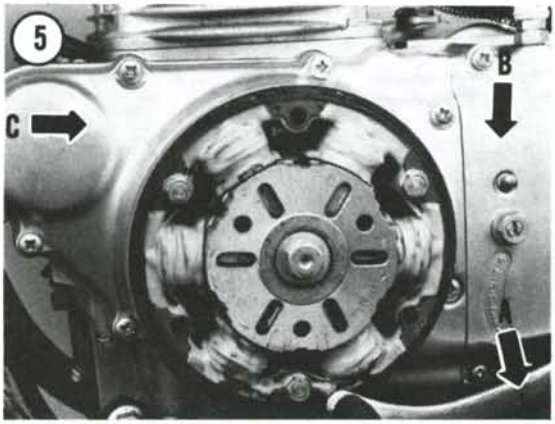
If charging current was considerably lower than specified, check the alternator and



rectifier. If the charging current was too high, which is less likely, the regulator is probably at fault.

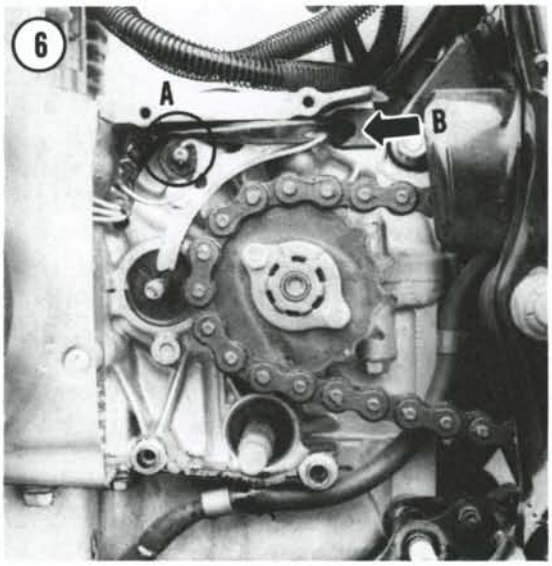
To check the alternator, proceed as follows.
1. Remove the alternator stator, then check for continuity between each pair of leads coming from it. If any pair of leads shows no continuity, replace the stator.
2. Set the ohmmeter to its highest range, then check that there is no continuity between any lead and the stator frame. Replace the stator if there is any shorted lead.
3. Check all coils and wiring for chafing, broken connections, etc. Repair or replace as required.
4. Alternator rotors occasionally lose magnetism as a result of old age, presence of strong magnetic fields or a sharp blow. Should the situation occur, it must be replaced.



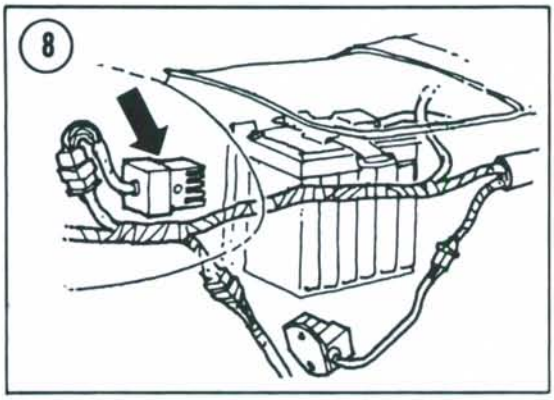


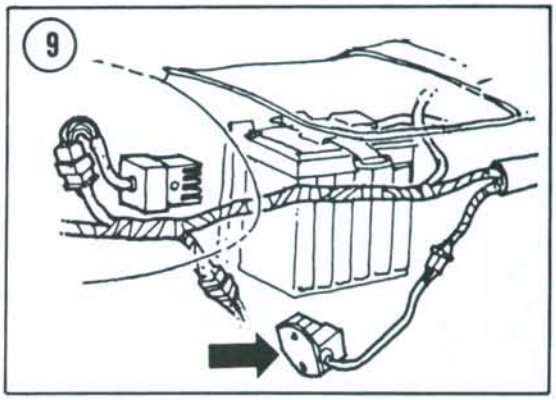
Alternator
Removal/Installation

1. Remove the gearshift lever (A, **Figure 5**).
2. Remove the right-hand rear crankcase cover (B, **Figure 5**).
3. Disconnect the electrical wire going to the neutral indicator switch (A, **Figure 6**).
4. Disconnect the electrical connector on the wires coming from the alternator.
5. Remove the alternator cover (C, **Figure 5**) and pull the rubber grommet free from the crankcase (B, **Figure 6**).
6. Remove the bolt securing the alternator rotor. Screw in a flywheel puller (Honda part No. 07933-216000) and remove the rotor. Refer to **Figure 7**.
7. Install by reversing these removal steps, noting the following.
8. Install the alternator rotor bolt and tighten to 21.7-25.3 ft.-lb. (3.0-3.5 mkg).









Rectifier

All models are equipped with a full-wave bridge rectifier (**Figure 8**).

To test the rectifier, disconnect the rectifier electrical connector from the harness.

Use an ohmmeter and connect the negative (-) lead to the green terminal. Connect the positive (+) lead to the red/white, then the yellow and then the pink terminal. There should be continuity. If there is no continuity at any of these terminals, the rectifier is faulty and must be replaced.

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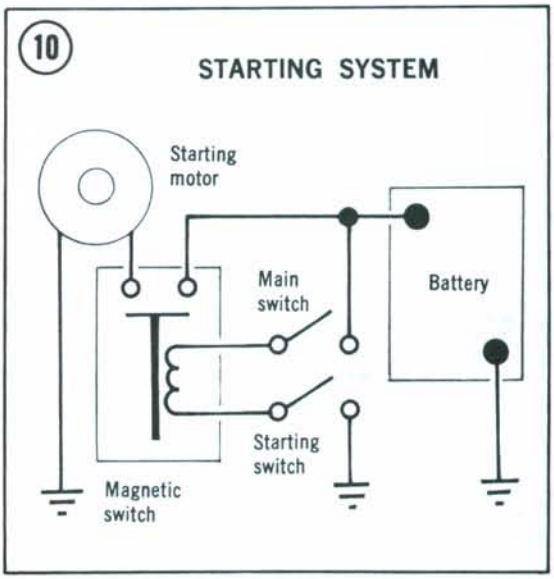
Continuity should not exist between any other combination of terminals other than those previously tested.

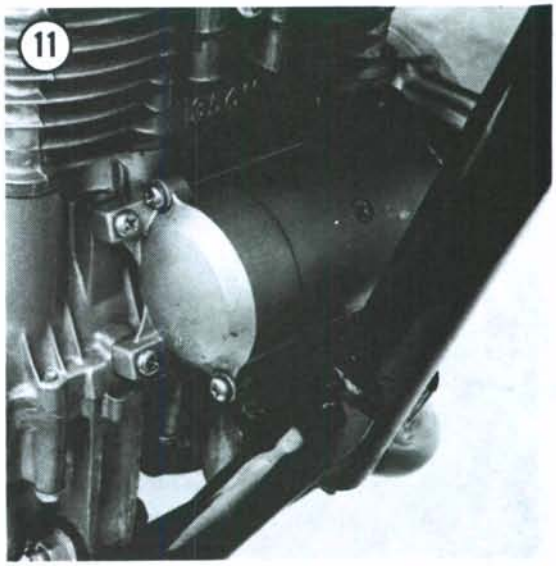
Always handle the rectifer assembly carefully. Do not bend or try to rotate the wafers. Do not loosen the screw which holds the assembly together. Moisture can damage the assembly, so keep it dry.

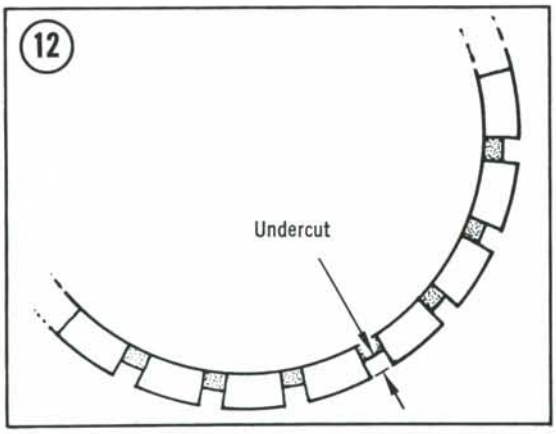
Never run the engine with the battery disconnected or without a fuse; doing so can cause immediate rectifier destruction.

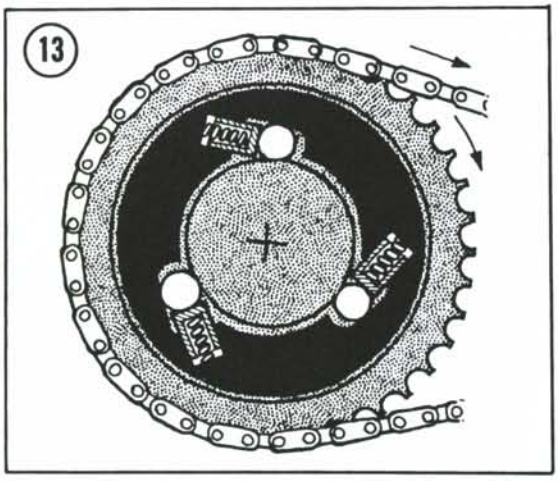
Voltage Regulator

Problems with the voltage regulator (**Figure 9**) are infrequent. The easiest way to test it is to connect the test circuit as shown in **Figure 4**. Compare battery charging current at various engine speeds with the voltage









regulator alternately connected and disconnected. If charging current is limited to those values specified in **Table 2** when the regulator is connected, the voltage regulator is in good condition.

ELECTRIC STARTER

Figure 10 is a diagram of a typical starting system.

Circuit Operation

When the rider presses the starter pushbutton, current flows from the battery through the coil of the starter relay if the main switch is closed. Current through the relay coil causes its plunger to be pulled upward, thereby bridging the 2 heavy contacts in the starter relay and completing the circuit from the battery to the starter motor.

Starter Motor

The starter motor (**Figure 11**) is wound in series for high torque and draws approximately 120 amperes under normal starting conditions. This figure can vary considerably depending on engine temperature, starter condition and other factors.

If starter problems are encountered, overhaul is best performed by a shop specializing in small motor repair or auto electrical systems. Some checks and service can be done by the layperson.

1. Remove and disassemble the starter motor.
2. If either brush is excessively worn, replace both brushes.
3. Examine the commutator for roughness or burning. Minor roughness may be smoothed with fine sandpaper. After smoothing, be sure that the mica insulators between commutator segments are undercut to a depth of at least 0.012 inch (0.3 mm) as shown in **Figure 12.**
4. Use an armature growler or ohmmeter to determine that no commutator segment is shorted to the shaft.
5. Using an ohmmeter, determine that there is continuity between every adjacent pair of commutator segments.
6. With the starter disassembled, determine that there is continuity between the ungrounded brush holder and the starter terminal.
7. Using the highest ohmmeter range, determine that there is no continuity between the starter terminal and starter motor housing.

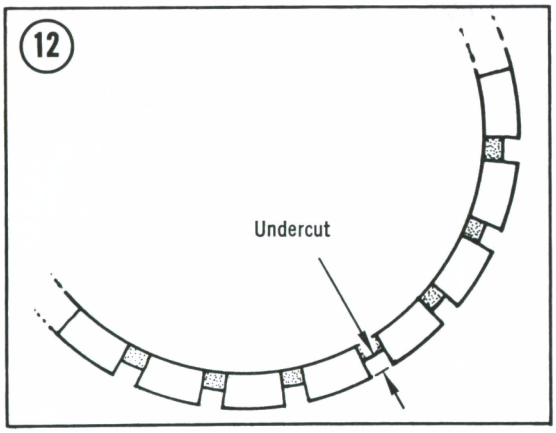
Table 3 lists symptoms, probable causes and remedies for possible starter malfunctions.

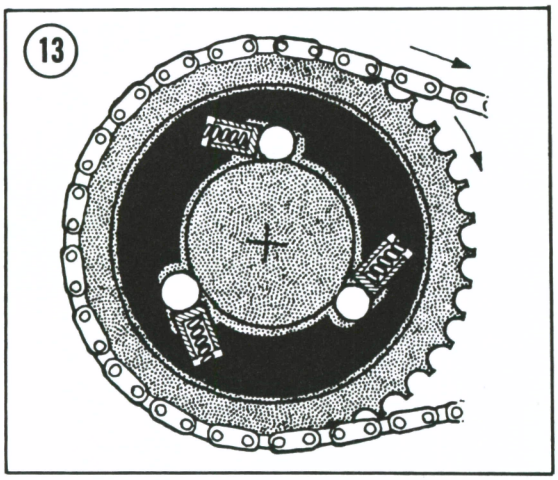
Starter Drive

The starter turns the engine through a chain and over-running clutch (**Figure 13**).

To check the starter drive, it is only necessary to check that it transmits torque in one direction only. Disassemble the unit and check all springs and rollers in the event of malfunction.

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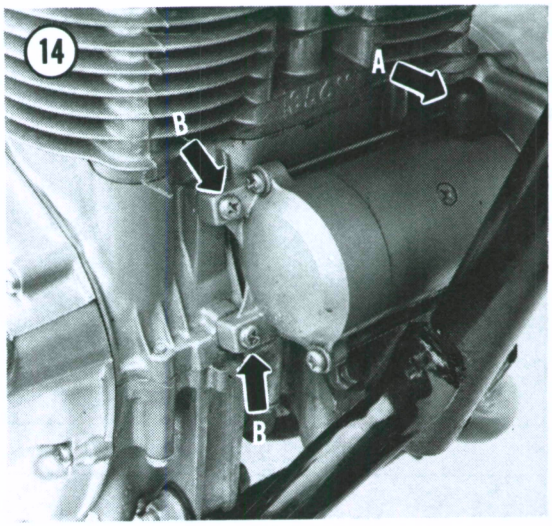
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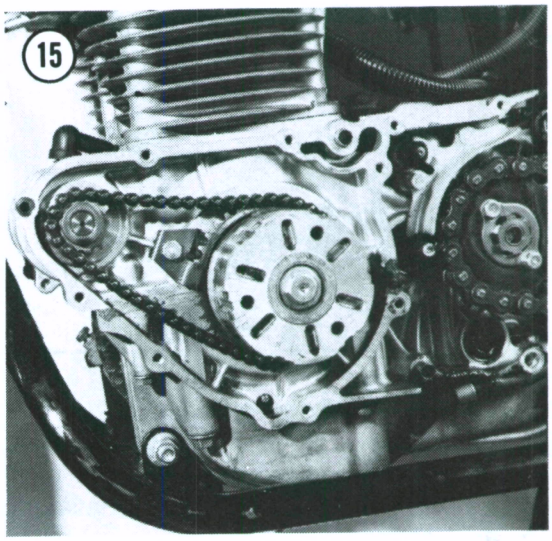
Starter Relay

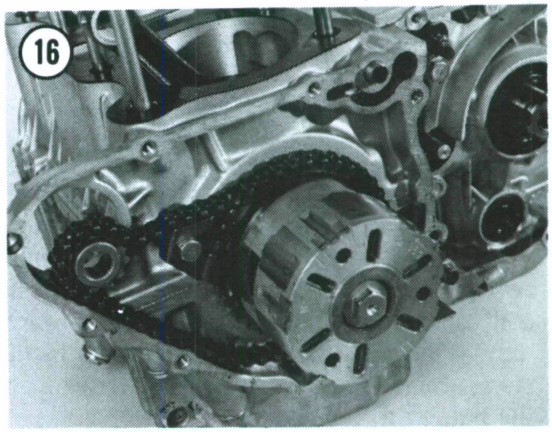
After long service, contacts in the starter relay may pit and burn or the coil may burn out. To test this unit, connect the motorcycle battery between the relay coil terminals which usually are yellow/red and black. If no click occurs, replace the relay. If the relay clicks, the relay coil is okay but its contacts may be pitted or burned. To correct this problem disassemble the starter relay and lightly dress its contacts with a fine file. Do not remove any more metal than necessary.

Starter Motor
Removal/Installation

1. Remove the gearshift lever (A, **Figure 5**).
2. Remove the right-hand rear crankcase cover (B, **Figure 5**).
3. Remove the alternator cover (C, **Figure 5**).
4. Disconnect the starter electrical cable (A, **Figure 14**).
5. Remove the screws (B, **Figure 14**) securing the starter motor and tap the starter out toward the right-hand side. Slide the small sprocket and chain (**Figure 15**) off of the starter shaft during removal.
6. If necessary, remove the small sprocket and chain (**Figure 16**).
7. Install by reversing the preceding steps.







LIGHTS

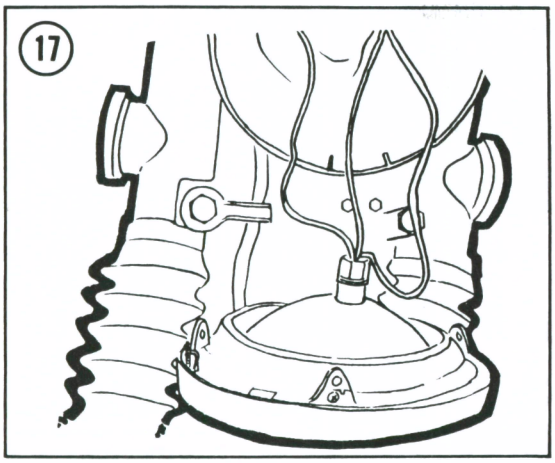
The headlight assembly consists primarily of a headlight lens and reflector unit, rim and related hardware.

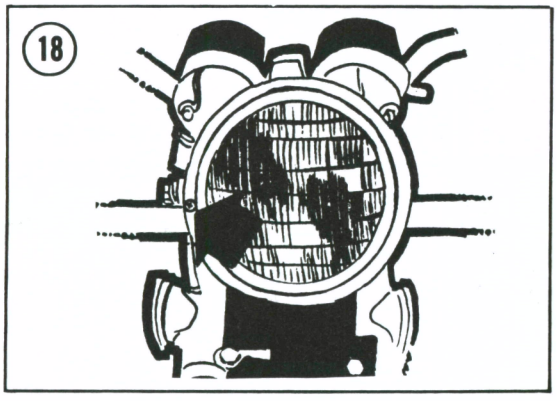
In the event of lighting problems, first check the affected bulb. Poor ground connections are another cause of lamp malfunctions.

Turn signals usually operate from direct current supplied by the battery. When replacing the signal bulbs, always be sure to use the proper type. Erratic operation or even failure to flash may result from the use of wrong bulbs.

Stoplights usually operate from direct current also. Stoplight switches should be adjusted so that the lamp comes on just before braking action begins. Front brake stoplight switches are frequently built into the front brake cable and are not adjustable.

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HEADLIGHT

Replacement

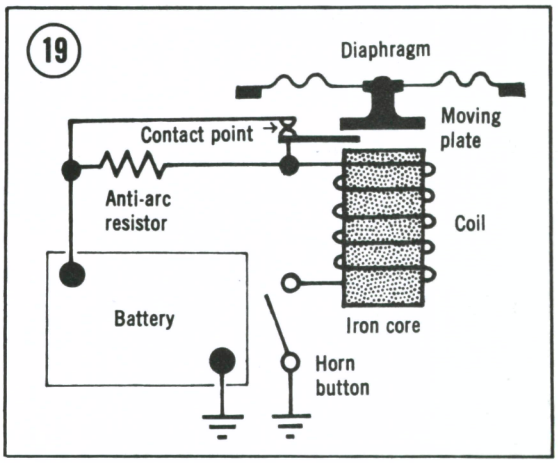
Refer to **Figure 17**.

1. Remove 3 screws and remove headlight from case.
2. Disconnect socket from sealed beam.
3. Remove 2 retaining lock pins and screws from rim.
4. Remove sealed beam.
5. Installation is the reverse of these steps. Adjust headlight as described below.

Adjustment

Adjust headlight horizontally and vertically according to Department of Motor Vehicle regulations in your state.

To adjust headlight horizontally, turn the screw illustrated in **Figure 18**. To adjust vertically, loosen the bolts on either side of the case. Move the headlight to the desired position, then tighten bolts.



TAIL/STOPLIGHTS

Taillight Replacement

A single bulb performs as a taillight, license plate light and stoplight. To replace the bulb, remove the lens and turn the bulb counterclockwise.

LIGHTING PROBLEMS

Bulbs which continuously burn out may be caused by excessive vibration, loose connections that permit sudden current surges, poor battery connections or installation of the wrong-type bulb.

A dead battery or one which discharges quickly may be caused by a faulty alternator or rectifier. Check for loose or corroded terminals.

Shorted battery cells or broken terminals will keep a battery from charging. Low water level will decrease a battery's capacity. A battery left uncharged after installation will sulphate, rendering it useless. Refer to Chapter Three, *Battery Service.*

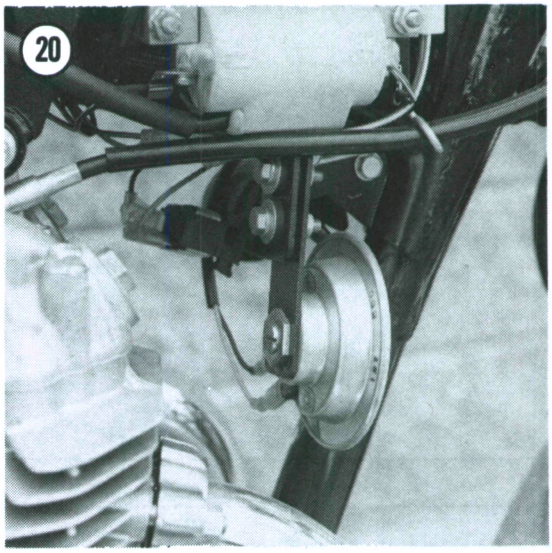
A majority of light and horn or other electrical accessory problems are caused by loose or corroded ground connections. Check those first and then substitute known good units for easier troubleshooting.

HORN

A typical horn circuit is shown in **Figure 19**. Current for the horn is supplied by the battery. One terminal is connected to the battery through the main switch. The other

terminal is grounded when the horn button is pressed.

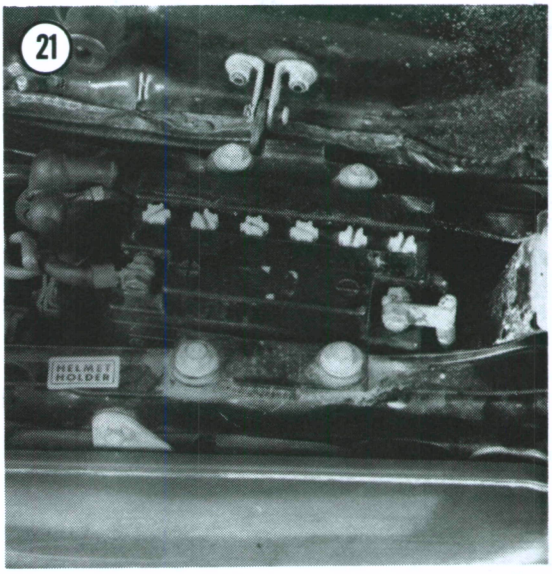
The horn (**Figure 20**) will not sound if its contact points are burned. Dress them with a small point file or flex stone.



BATTERY SERVICE

Honda motorcycles are equipped with lead-acid storage batteries (**Figure 21**).

Refer to Chapter Three, *Battery*, for maintenance procedures.



WIRING DIAGRAMS

Full-color wiring diagrams are at the end of the book.

Table 1 IGNITION SYSTEM PROBLEMS

Symptom	Probable Cause	Remedy
No spark or weak spark	Discharged battery	Charge battery
	Defective fuse	Replace
	Defective main switch	Replace
	Loose or corroded connections	Clean and tighten
	Broken wire	Repair
	Incorrect point gap	Reset points. Be sure to readjust ignition timing
	Dirty or oily points	Clean points
	Spark plug lead damaged	Replace wire
	Broken primary wire	Repair wire
	Open winding in coil	Replace coil
	Shorted winding in coil	Replace coil
	Defective condenser	Replace condenser

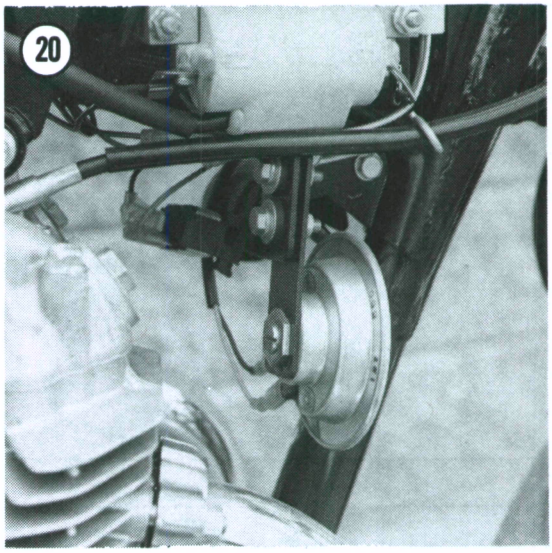
Table 2 ALTERNATOR OUTPUT

Model	Charging Starts	Test Rpm	Minimum Voltage	Current (Amperes)
250	2,000	5,000	14.8	1.2 maximum
		10,000	15.5	4.0 maximum
360	2,100	5,000	14.8	1.2 minimum
		10,000	15.5	4.0 maximum

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terminal is grounded when the horn button is pressed.

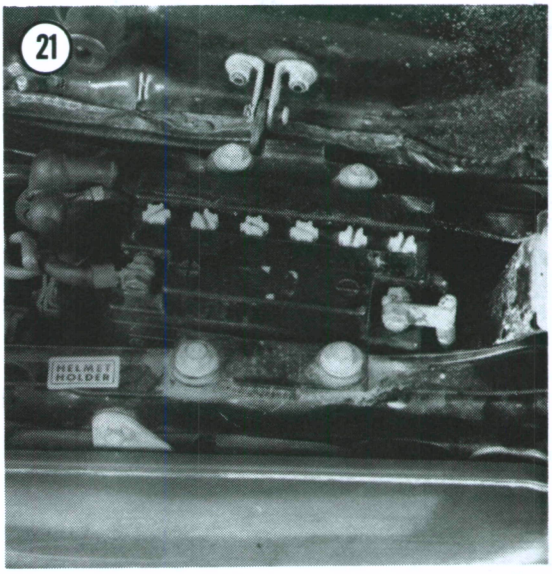
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Table 1 IGNITION SYSTEM PROBLEMS

Symptom	Probable Cause	Remedy
No spark or weak spark	Discharged battery	Charge battery
	Defective fuse	Replace
	Defective main switch	Replace
	Loose or corroded connections	Clean and tighten
	Broken wire	Repair
	Incorrect point gap	Reset points. Be sure to readjust ignition timing
	Dirty or oily points	Clean points
	Spark plug lead damaged	Replace wire
	Broken primary wire	Repair wire
	Open winding in coil	Replace coil
	Shorted winding in coil	Replace coil
	Defective condenser	Replace condenser

Table 2 ALTERNATOR OUTPUT

Model	Charging Starts	Test Rpm	Minimum Voltage	Current (Amperes)
250	2,000	5,000	14.8	1.2 maximum
		10,000	15.5	4.0 maximum
360	2,100	5,000	14.8	1.2 minimum
		10,000	15.5	4.0 maximum

Table 3 STARTER TROUBLESHOOTING

Symptom	Probable Cause	Remedy
Starter does not work	Low battery	Recharge battery
	Worn brushes	Replace brushes
	Internal short	Repair or replace defective component
	Defective wiring or connections	Repair wire or clean and tighten connections
	Defective switch	Replace switch
Starter action is weak	Low battery	Recharge battery
	Pitted relay contacts	Clean contacts or replace voltage regulator
	Brushes worn	Replace brushes
	Defective wiring or connections	Repair wire or clean and tighten
	Short in armature	Replace armature
Starter runs continuously	Stuck relay	Dress contacts
Starter turns but engine does not	Defective starter drive	Repair or replace starter drive

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CHAPTER SEVEN

FRAME, SUSPENSION AND STEERING

This chapter provides all service procedures for the wheels, brakes, chassis and related components.

Tables 1-3 are at the end of this chapter.

HANDLEBAR

Removal

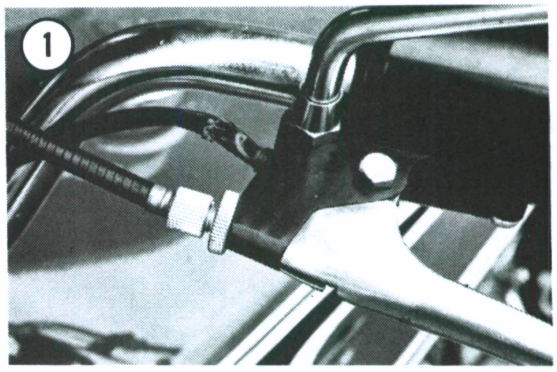
1. Loosen the clutch cable locknut and turn the adjuster barrel all the way in toward the hand grip (**Figure 1**). Remove the clutch cable from the hand lever.

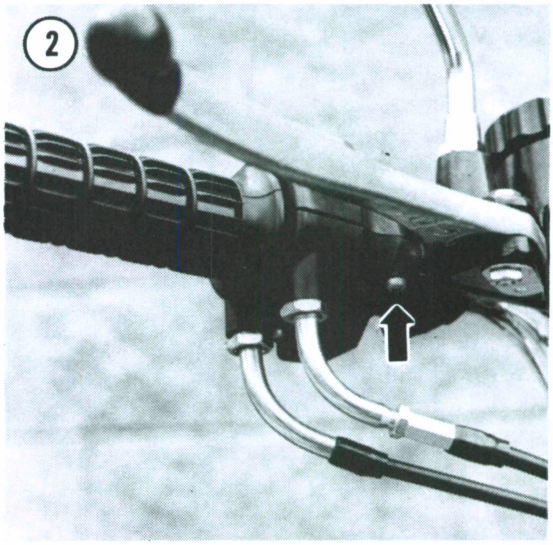
2A. On models with a front drum brake, loosen the brake cable locknut and turn the adjuster barrel all the way in toward the hand grip. Remove the brake cable from the hand lever.

CAUTION

On models with disc brakes, cover the fuel tank and surrounding frame with a heavy cloth or plastic tarp to protect it from accidental spilling of brake fluid. Wash any spilled brake fluid off any painted or plated surface immediately, as it will destroy the finish. Use soapy water and rinse thoroughly.

2B. On models with a front disc brake, remove the bolts securing the master cylinder to the handlebar. Lay the master cylinder and hydraulic brake hose back onto the fuel tank.

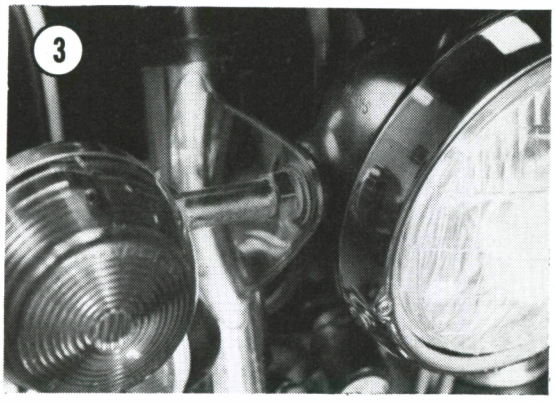


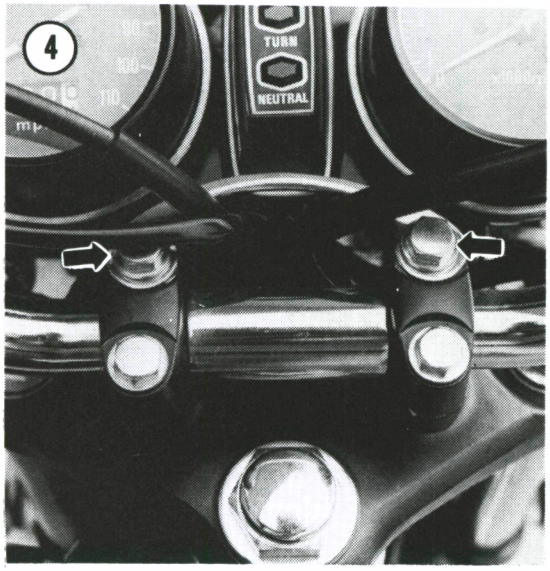


It is not necessary to remove the brake line from the master cylinder.
3. Loosen the clamping screws on the throttle grip and slide the assembly off of the handlebar (**Figure 2**).
4. Remove the headlight assembly (**Figure 3**). Disconnect all electrical connectors going to the handlebar switches.
5. Remove the bolts securing the handlebar holders and remove the holders (**Figure 4**).
6. Remove the handlebar assembly from the top bridge.

Inspection

1. Check cables for chafed or kinked housings. Oil the control cables and make sure the cables move freely; if not, replace the cables.





2. Twist the throttle grip. Operation should be smooth throughout its entire travel.
3. Check the clutch lever and the brake lever (on models with drum brakes).
4. Check handlebar tubing for cracks or bends. Replace if necessary.
5. Check electrical switches for proper operation. Replace if necessary.
6. Inspect wiring for chafed or frayed insulation. Be sure wire connnectors are clean and free of corrosion.

Installation

1. Install by reversing the removal steps, noting the following.
2. Route the control cables so they will not get pinched when the handlebar is moved from side to side.
3. Check cables for free movement.
4. Be sure that the electrical connectors are properly connected and are tight.
5. Adjust the clutch, throttle and brake cable (models with drum brakes) as described in Chapter Three.

STEERING STEM

Disassembly

Refer to **Figure 5** for this procedure.
1. Remove the front wheel as described in this chapter.
2. Remove the handlebar assembly (A, **Figure 6**) as described in this chapter.
3. Disconnect the tachometer and speedometer cables.
4. Remove the headlight assembly.
5. Remove the front fork assemblies as described in this chapter.
6. On models with disc brakes, remove the name plate on the lower fork bridge. Disconnect the electrical wires from the brake light switch. Remove the bolt securing the hydraulic brake line joint and remove the joint and brake hoses from the fork bridge. It is not necessary to remove the brake hoses from the brake line joint.
7. Remove the steering stem nut and washer (B, **Figure 6**). Remove the upper fork bridge.

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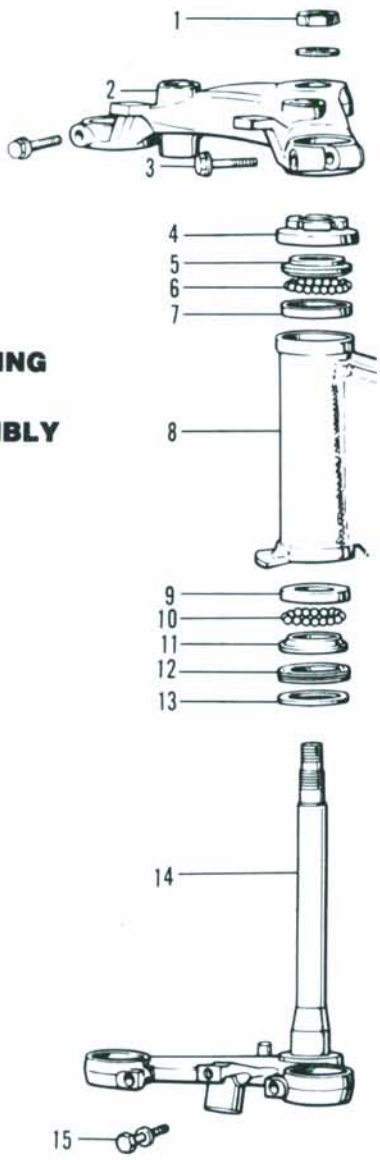
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7. Remove the steering stem nut and washer (B, **Figure 6**). Remove the upper fork bridge.

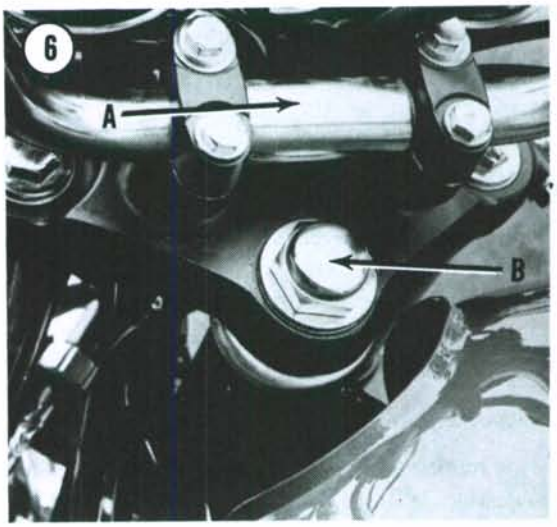
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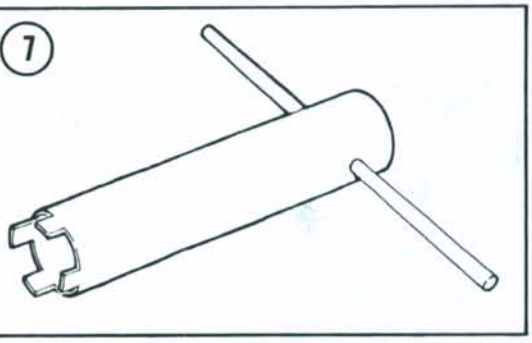
STEERING STEM ASSEMBLY

1. Steering stem nut
2. Upper fork bridge
3. Bolt
4. Steering stem adjust nut
5. Top bearing inner race
6. Ball bearings (18)
7. Top bearing headset race
8. Steering head
9. Lower bearing headset race
10. Ball bearings (19)
11. Lower bearing inner race
12. Dust seal
13. Dust seal washer
14. Steering stem
15. Bolt

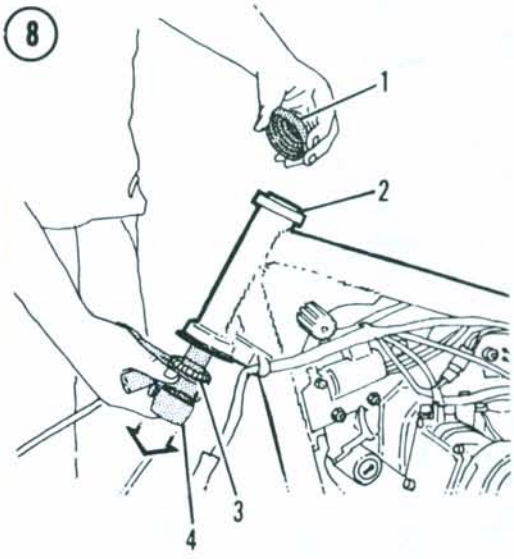
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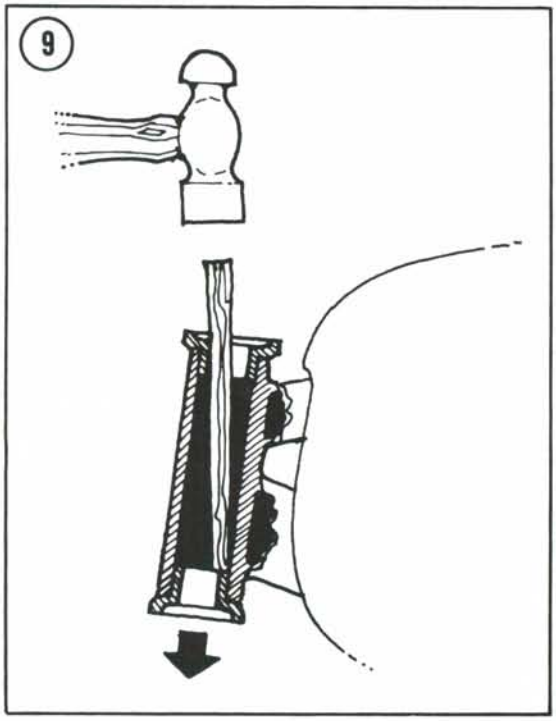
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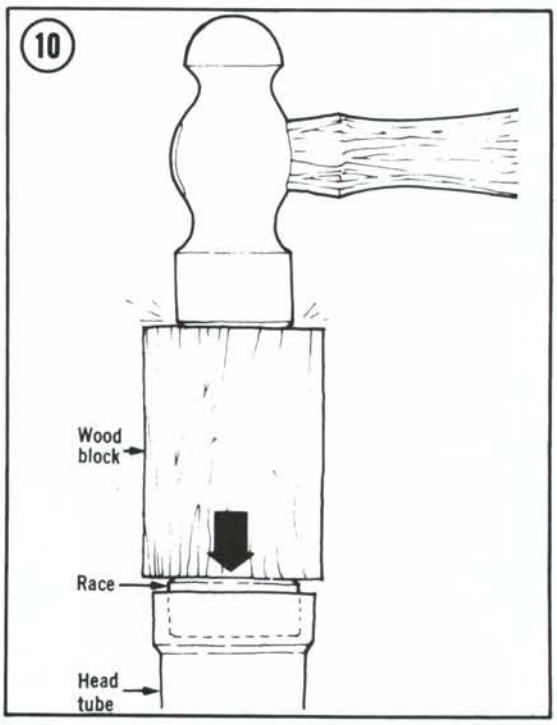


8



1. Adjuster nut
2. Head pipe
3. Steel balls
4. Steering stem





8. Remove the steering stem adjust nut with a pin spanner or an easily improvised tool (**Figure 7**).
9. Have an assistant hold a large pan under the steering stem to catch the loose ball bearings and carefully remove the steering stem assembly (**Figure 8**).

Inspection

1. Clean the bearing races in the steering head, the steering stem races and all the ball bearings with solvent.
2. Check for broken welds on the frame around the steering head.
3. Check each of the balls for pitting, scratches or discoloration indicating wear or corrosion. Replace them in sets if any are bad.
4. Check the races for pitting, galling and corrosion. If any of these conditions exist, replace the races as described under *Steering Head Bearing Races* in this chapter.
5. Check the steering stem for cracks and check its race for damage or wear. If this race or any race is damaged, the bearings should be replaced as a complete bearing set. Take the old races and bearings to your dealer to ensure accurate replacement.

Steering Head Bearing Races

The headset and steering stem bearing races are pressed into place. Because they are easily bent, do not remove them unless they are worn and require replacement.

Headset bearing race removal/installation

NOTE

The upper and lower bearings and races are not the same size. The lower one is the larger of the two. Be sure that you install them at the proper ends of the head tube.

To remove the headset race, insert a hardwood stick or soft punch into the head tube (**Figure 9**) and carefully tap the race out from the inside. After it is started, tap around the race so that neither the race nor the head tube is damaged. To install the headset race, tap it in slowly with a block of wood, a suitable size socket or piece of pipe (**Figure 10**). Make sure that the race is squarely seated in the headset race bore before tapping it into place. Tap the race in until it is flush with the steering head surface.

Steering stem bearing race and grease seal removal/installation

1. To remove the steering stem race, try twisting and pulling it up by hand. If it will not come off, carefully pry it up with a screwdriver; work around in a circle, prying a little at a time.
2. Remove the lower bearing race, dust seal and dust seal washer.
3. Install the dust seal washer, the dust seal and the race. Slide the lower race over the steering stem with the bearing surface pointing up.
4. Tap the race down with a piece of hardwood; work around in a circle so the race will not be bent. Make sure it is seated squarely and is all the way down.

Steering Head Assembly

Refer to **Figure 5** for this procedure.
1. Make sure the steering head and stem races are properly seated.
2. Apply a coat of cold grease to the upper bearing race cone and fit 18 ball bearings around it (**Figure 11**).
3. Apply a coat of cold grease to the lower bearing race cone and fit 19 ball bearings around it (**Figure 12**).
4. Install the steering stem into the head tube and hold it firmly in place.
5. Install the upper bearing race.
6. Install the steering stem adjusting nut and tighten it until it is snug against the upper race, then back it off 1/8 turn.

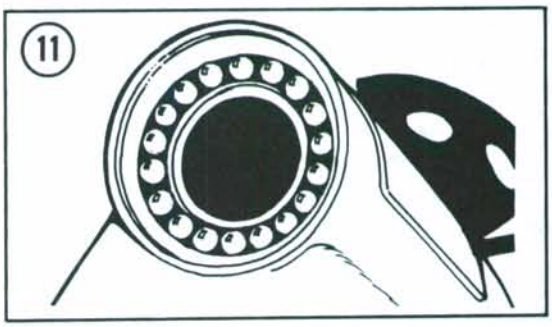
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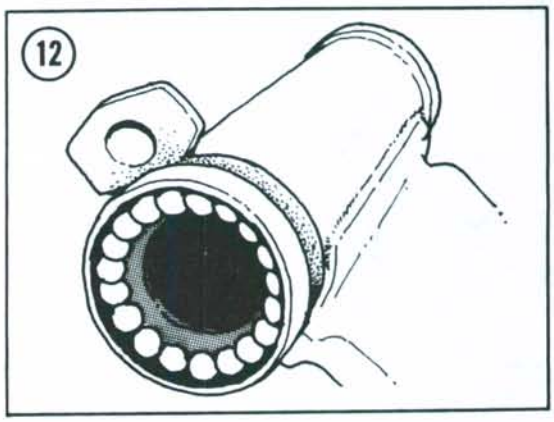
*The adjusting nut should be just tight enough to remove both horizontal and vertical play (**Figure 13**), yet loose enough so that the assembly will turn to both lock positions under its own weight after an assist.*

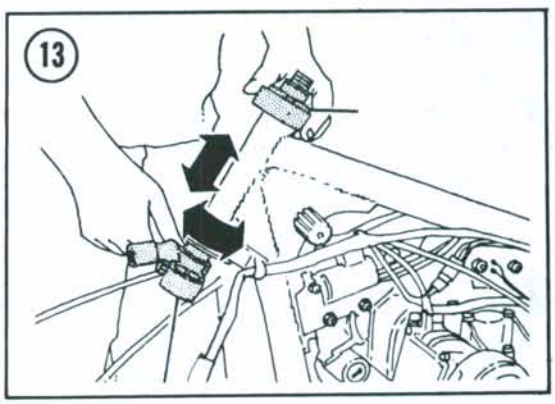
7. Install the upper fork bridge, washer and steering stem nut finger-tight.

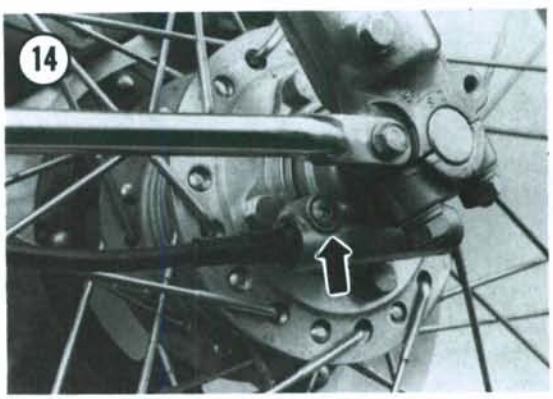
NOTE

Steps 8-10 must be performed in this order to assure proper upper and lower fork bridge to fork alignment.







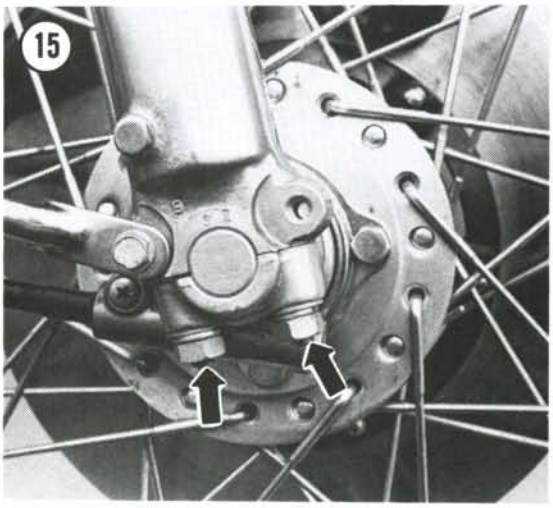


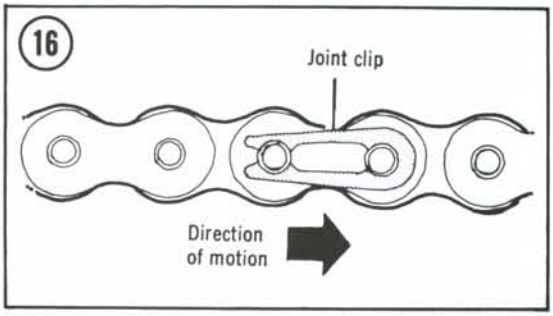
8. Slide the fork tubes into position and tighten the lower fork bridge bolts to 13-18 ft.-lb. (1.8-2.5 mkg).

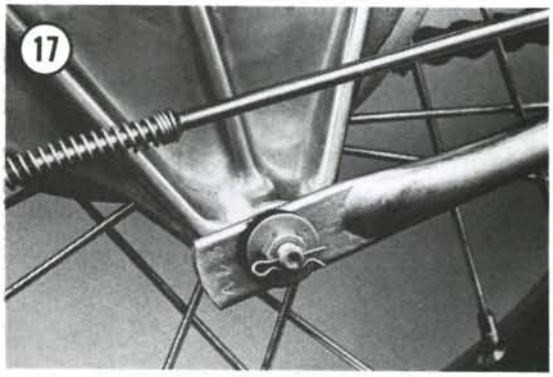
NOTE

Install the fork tubes so that the top of the fork tube aligns with the top surface of the upper fork bridge.

9. Tighten the steering stem nut to 51-65 ft.-lb. (7.0-9.0 mkg).







10. Tighten the upper fork bridge bolts to 13-15 ft.-lb. (1.8-2.2 mkg).
11. Continue assembly by reversing Steps 1-6, *Steering Stem Disassembly.*
12. After a few hours of riding, the bearings have had a chance to seat; readjust the free play in the steering stem with the steering stem adjusting nut. Refer to Step 6.

Steering Stem Adjustment

If play develops in the steering system, it may only require adjustment. However, don't take a chance on it. Disassemble the stem and look for possible damage. Then reassemble and adjust as described in Step 6 of the *Steering Head Assembly* procedure.

WHEELS

Front Wheel Removal/Installation

1. Jack up the engine and place a wooden block under the frame to support the bike securely with the front wheel off of the ground.
2A. On drum brake models, remove the nut securing the brake stopper arm to the brake panel. Loosen the screw and remove the speedometer drive cable. Disconnect the brake cable from the brake arm on the brake panel.
2B. On disc brake models, loosen the screw (**Figure 14**) and remove the speedometer drive cable.
3. Remove the nuts and lockwashers securing the axle holders and remove the axle holders (**Figure 15**).
4. Remove the front wheel and front axle.
5. Install by reversing the removal steps, noting the following:
6. Install the axle holder, lockwashers and nuts. Tighten the front nut first and then the rear. After the nuts are tightened there will be a slight gap at the rear. Tighten the nuts to 19.5-23.8 ft.-lb. (2.7-3.3 mkg).

Rear Wheel Removal/Installation

1. Remove master link and chain (**Figure 16**).
2. Remove wire safety clip on rear brake torque link (**Figure 17**).

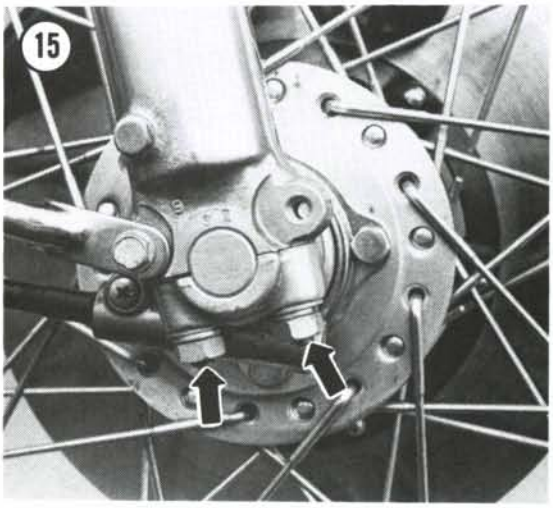
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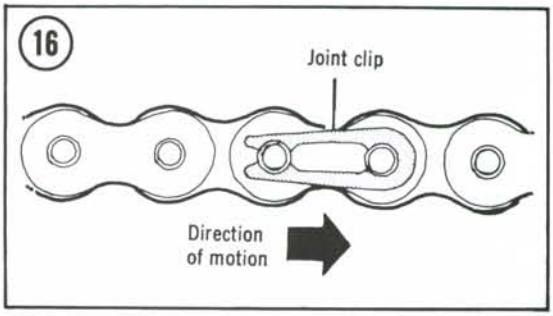
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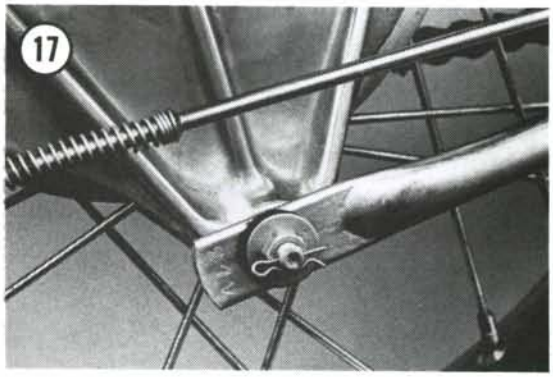
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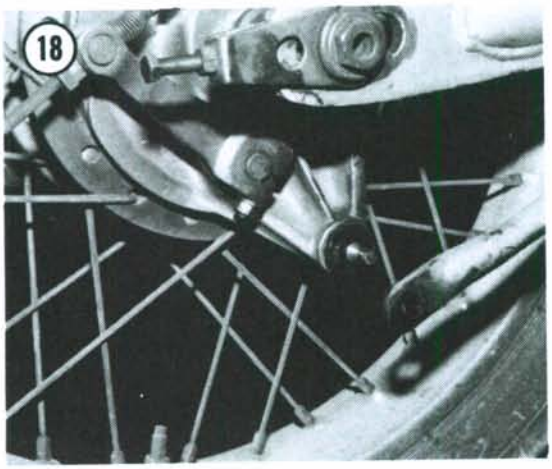
Rear Wheel Removal/Installation

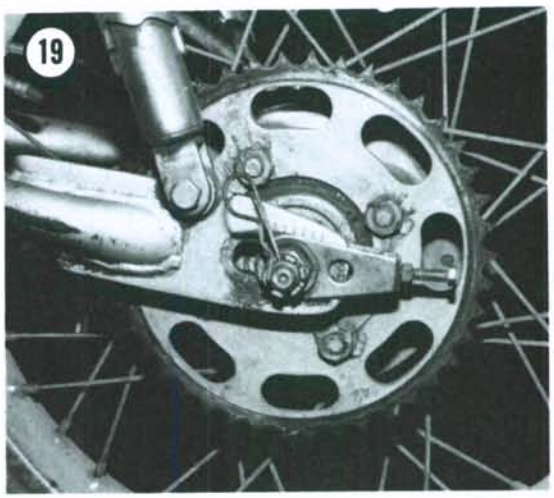
1. Remove master link and chain (**Figure 16**).
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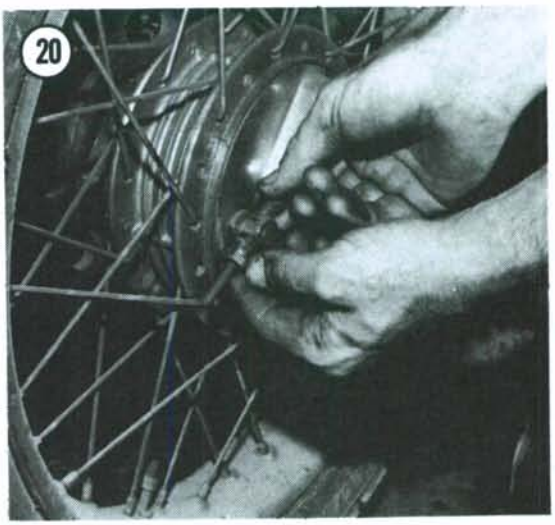
3. Remove nut and washer and remove rear brake torque link (**Figure 18**).
4. On other side, remove cotter pin, axle nut and washer (**Figure 19**).
5. Remove brake adjusting nut and disconnect brake rod (**Figure 20**).
6. Drive axle shaft out (**Figure 21**).
7. Pull wheel out to the rear (**Figure 22**).
8. To install rear wheel, perform the following steps:
   a. Insert wheel spacer (**Figure 23**).
   b. On other side, align axle and axle hole. Insert spacer and slide axle shaft in after greasing it. See **Figure 24**.
   c. Lightly tighten the axle nut (**Figure 25**) .
   d. Connect rear brake torque link with a washer and nut and install cotter pin (**Figure 26**).
   e. Install chain. Be sure master link is installed exactly as shown in **Figure 16**.
   f. Refer to **Figure 27**. Connect brake rod and thread brake adjusting nut onto rod. Turn each adjustment bolt (one on each side of the wheel) until there is 3/4-1 in. (20-25 mm) of up and down movement in the center of the lower chain run (**Figure 28**). Tighten the locknuts (one on each side of the wheel).

NOTE

Be sure that the reference marks on the swinging arm and the index marks on the chain adjuster are in the same relative position on each side.

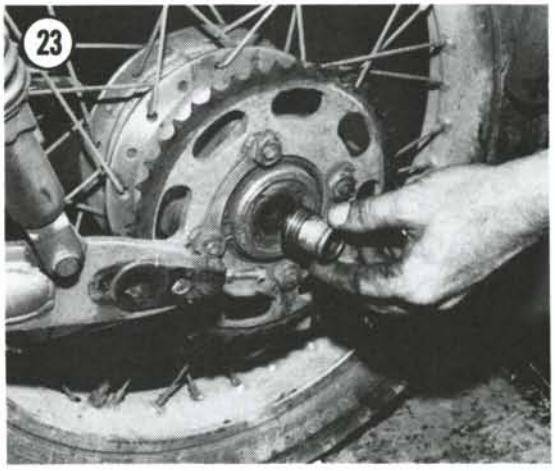


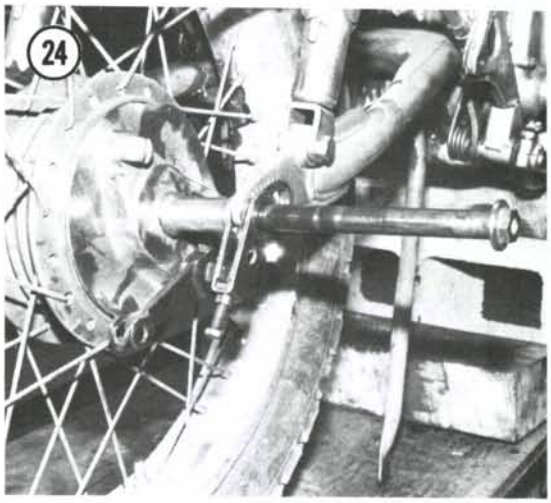


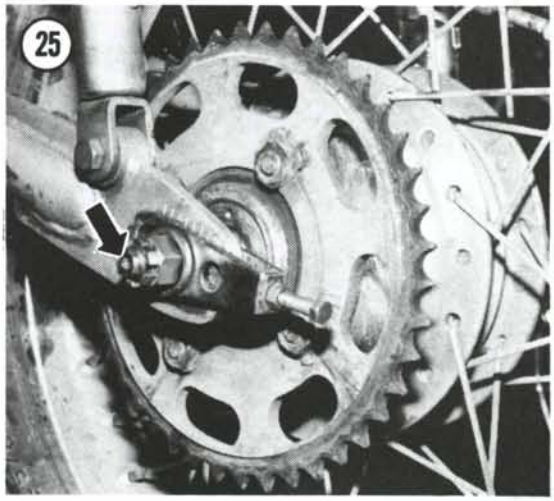


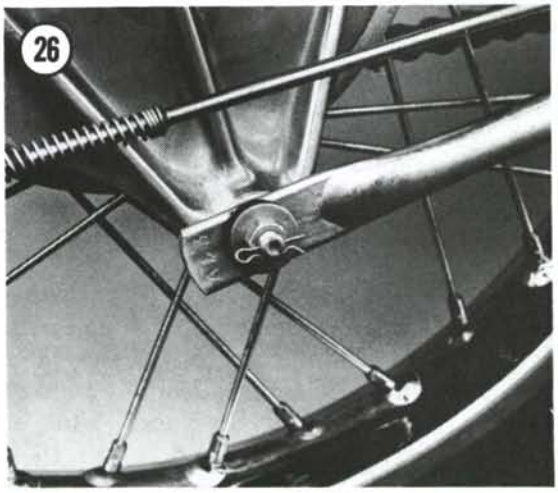


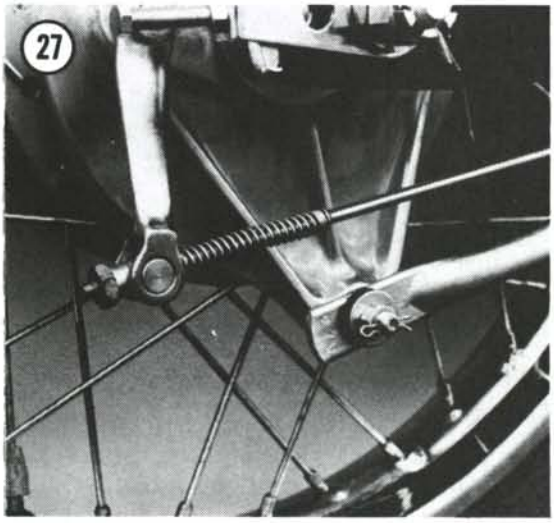

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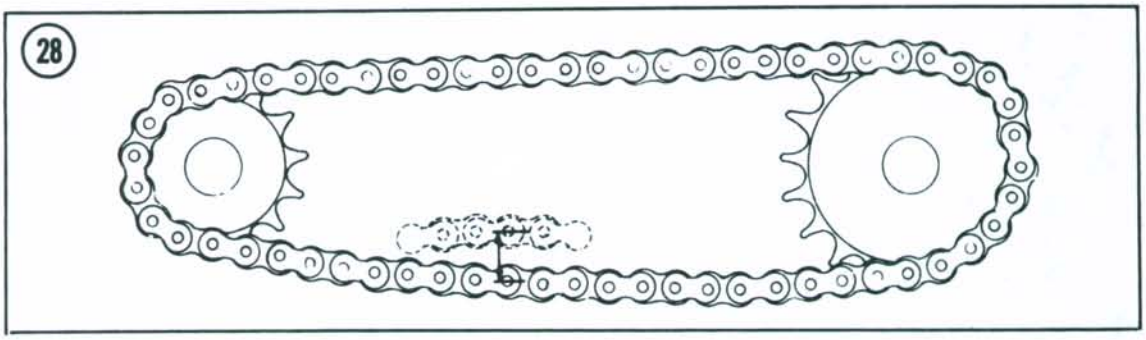

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g. Tighten the rear axle nut and install new cotter pin; refer to **Figure 29**.

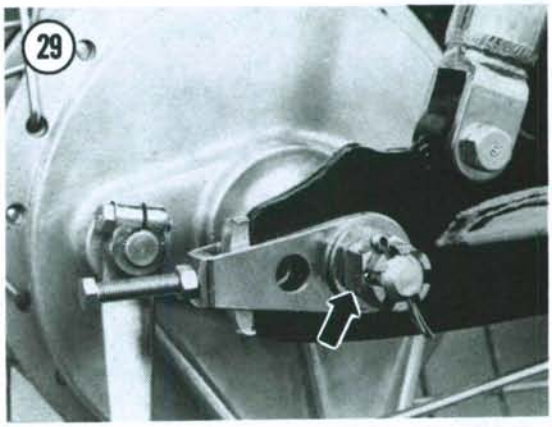
9. To adjust the rear brake, turn the adjusting nut (**Figure 30**) until the rear brake pedal has approximately 3/4-1 in. (20-25 mm) of free play (**Figure 31**).

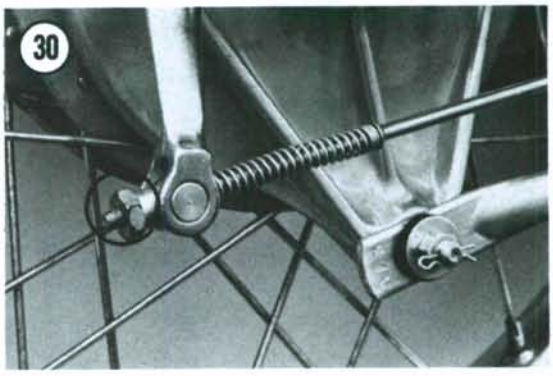
Wheel Inspection

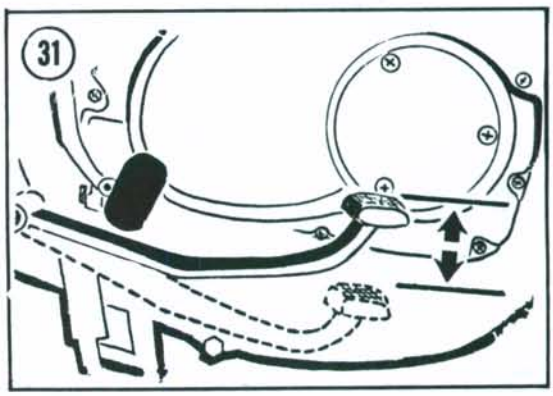
1. Refer to **Figure 32**. Mount the wheel so that a dial indicator can measure wheel rim runout. Observe the dial indicator while rotating the wheel. Runout limit for all models is 0.08 in. (2.0 mm).
2. Check axles for bends by supporting the axle by its center in a V-block, then rotating the shaft. Measure runout at each end with dial indicators. Replace any axle which is bent more than 0.008 in. (0.2 mm).
3. Check wheel bearings for cracks, galling or pitting. Rotate them by hand to check for roughness. Replace bearings if they are worn or damaged. If bearings are satisfactory, clean them in solvent, dry thoroughly and repack with fresh wheel bearing grease.
4. Check rear wheel shock absorbers for wear. Replace if worn or damaged.
5. Check spokes for looseness or bending. A bent or otherwise faulty spoke will affect neighboring ones and should be replaced immediately. Refer to *Spokes* in this chapter.
6. Inspect oil seals for wear or damage. Replace if there is any doubt about condition.
7. Check rims for bending or distortion.

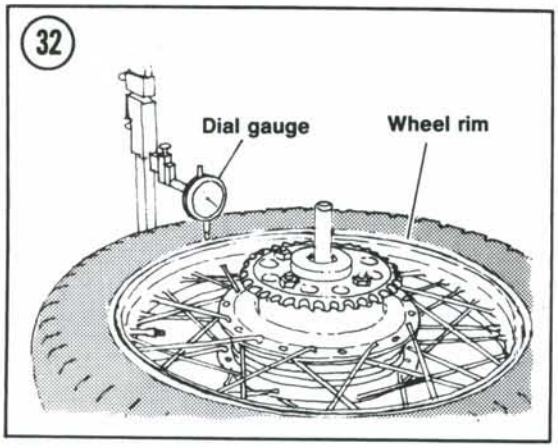
Wheel Balance

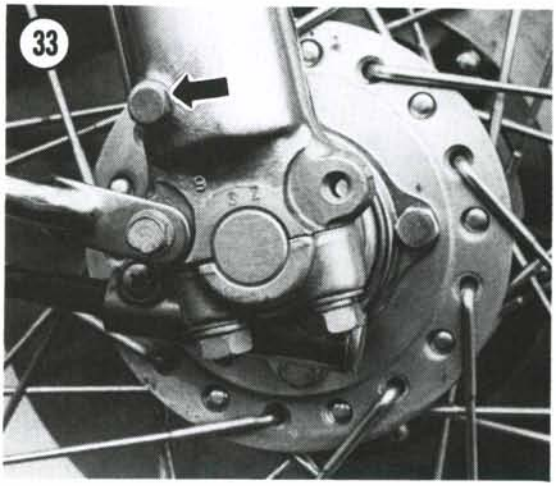
An unbalanced wheel results in unsafe riding conditions. Depending on the degree of unbalance and speed of the motorcycle, the rider may experience anything from a mild











vibration to a violent shimmy which may even result in loss of control. Balance weights may be installed to spokes on the light side of the wheel to correct this condition.

Before attempting to balance wheels, check to be sure that the wheel bearings are in good condition and properly lubricated. Also make sure that brakes don't drag, so that wheels may rotate freely. With the wheel free of the ground, spin it slowly and allow it to come to rest by itself. Add balance weights to the spokes on the light side as required so that the wheel comes to rest at a different position each time. Balance weights are available in weights of 10, 20 and 30 grams. Remove the drive chain before balancing rear wheel.

If more than one ounce is required to balance the wheel, add weight to adjacent spokes; never put two or more weights on the same spoke. When the wheel comes to rest at a different point each time the wheel is spun, consider it balanced and tightly crimp the weights so they won't be thrown off.

Spokes

Spokes should be checked for tightness. The "tuning fork" method of checking spoke tightness is simple and works well. Tap each spoke with a spoke wrench or shank of a screwdriver and listen to the tone. A tightened spoke will emit a clear, ringing tone, and a loose spoke will sound flat. All spokes in a correctly tightened wheel will emit tones of similar pitch but not necessarily the same precise tone.

Bent or stripped spokes should be replaced as soon as they are detected. Unscrew the nipple from the spoke, then depress the nipple into the rim far enough to free the end of the spoke, taking care not to push the spoke all the way in. Remove the damaged spoke from the hub and use it to match a new spoke of identical length. If necessary, trim the new spoke to match the original and dress the end of the threads with a die. Install the new spoke in the hub and screw on the nipple, tightening it until the spoke's tone is similar to the tone of the other spokes on the wheel. Periodically check the new spoke; it will stretch and must be retightened several times before it takes its final set.

FRONT FORKS

The front fork assembly serves as a shock absorber for the front wheel. Each leg consists of a spring and oil damper contained within telescoping tubes.

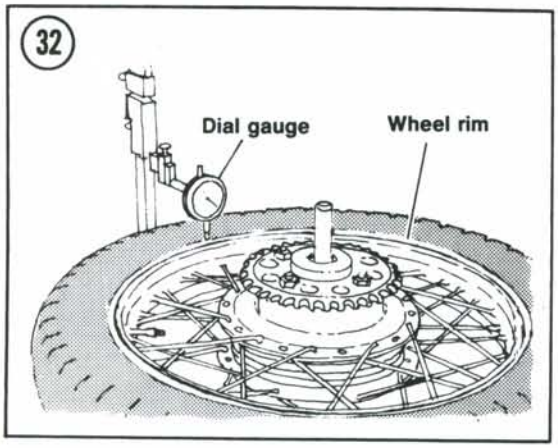
Removal

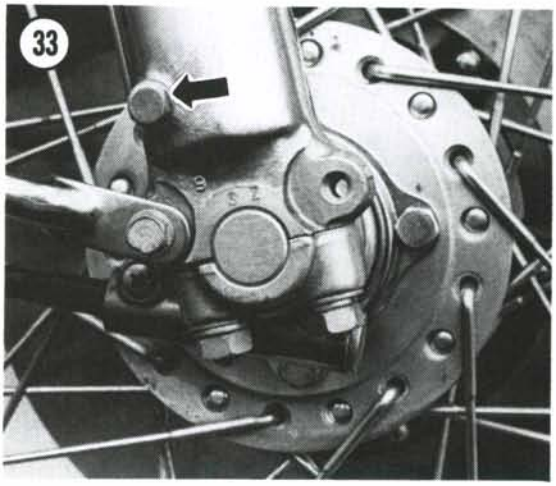
1. Place a pan under each fork leg, then remove drain plug at lower end of each fork leg and allow oil to drain out into pan (**Figure 33**).

NOTE
To aid in removing all of the oil, push down on the forks several times to force oil out.

2. Remove front wheel as described in this chapter.

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vibration to a violent shimmy which may even result in loss of control. Balance weights may be installed to spokes on the light side of the wheel to correct this condition.

Before attempting to balance wheels, check to be sure that the wheel bearings are in good condition and properly lubricated. Also make sure that brakes don't drag, so that wheels may rotate freely. With the wheel free of the ground, spin it slowly and allow it to come to rest by itself. Add balance weights to the spokes on the light side as required so that the wheel comes to rest at a different position each time. Balance weights are available in weights of 10, 20 and 30 grams. Remove the drive chain before balancing rear wheel.

If more than one ounce is required to balance the wheel, add weight to adjacent spokes; never put two or more weights on the same spoke. When the wheel comes to rest at a different point each time the wheel is spun, consider it balanced and tightly crimp the weights so they won't be thrown off.

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Spokes should be checked for tightness. The "tuning fork" method of checking spoke tightness is simple and works well. Tap each spoke with a spoke wrench or shank of a screwdriver and listen to the tone. A tightened spoke will emit a clear, ringing tone, and a loose spoke will sound flat. All spokes in a correctly tightened wheel will emit tones of similar pitch but not necessarily the same precise tone.

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FRONT FORKS

The front fork assembly serves as a shock absorber for the front wheel. Each leg consists of a spring and oil damper contained within telescoping tubes.

Removal

1. Place a pan under each fork leg, then remove drain plug at lower end of each fork leg and allow oil to drain out into pan (**Figure 33**).

NOTE
To aid in removing all of the oil, push down on the forks several times to force oil out.

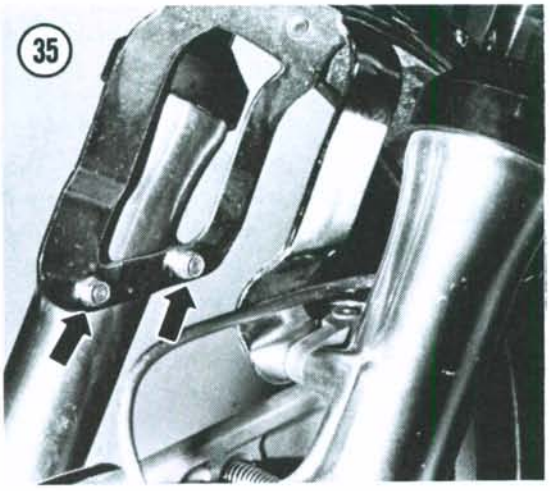
2. Remove front wheel as described in this chapter.

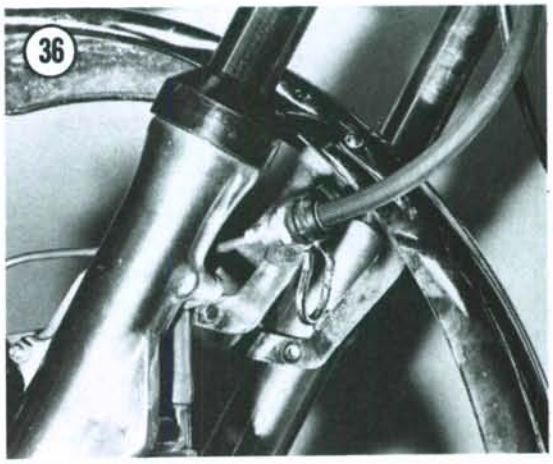
3. Remove headlight assembly (**Figure 34**).
4. Remove front fender bolts (**Figure 35**).
5. Disconnect hydraulic brake line from clip (**Figure 36**).
6. Remove fender (**Figure 37**).
7. Disconnect hydraulic brake line from brake caliper (**Figure 38**).
8. Remove brake caliper retaining bolts and remove caliper (**Figure 39**).
9. Remove plastic Honda name plate. See **Figure 40** and **Figure 41**.
10. Remove the top fork crown pinch bolts (**Figure 42**) and lower fork crown pinch bolts (**Figure 43**).
11. With a twisting motion, pull forks down and out (**Figure 44**).

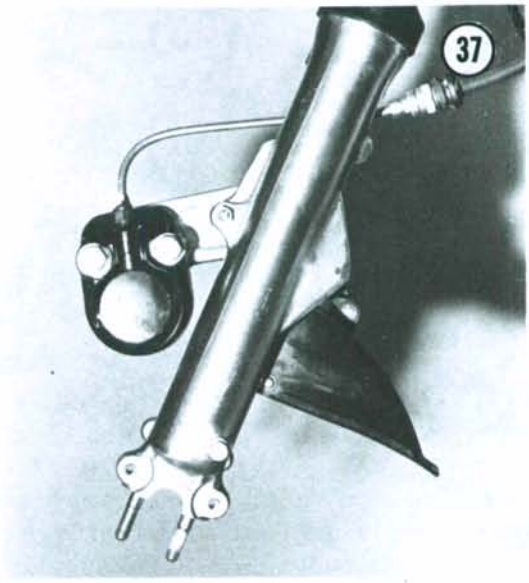
Disassembly

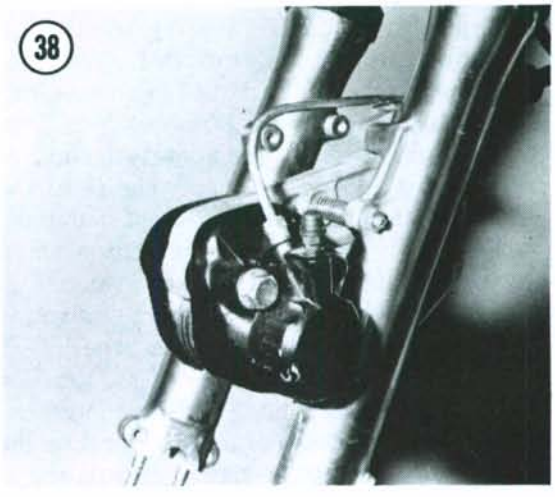
Refer to **Figure 45** during the disassembly and assembly procedures.



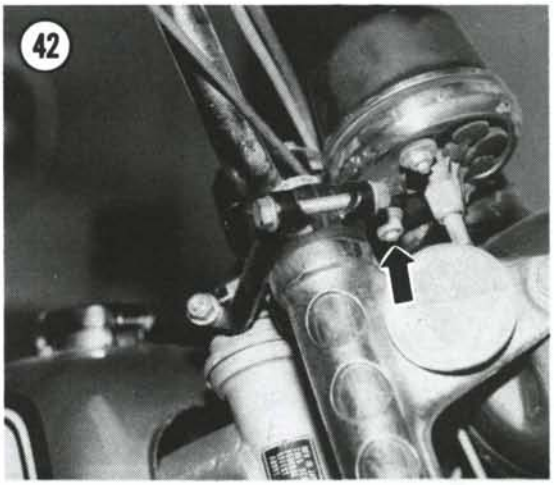


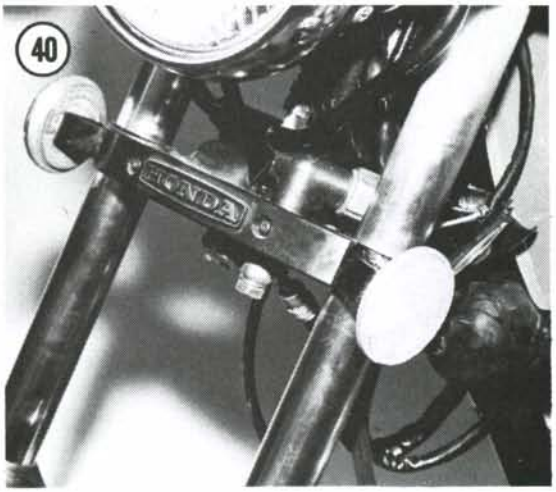


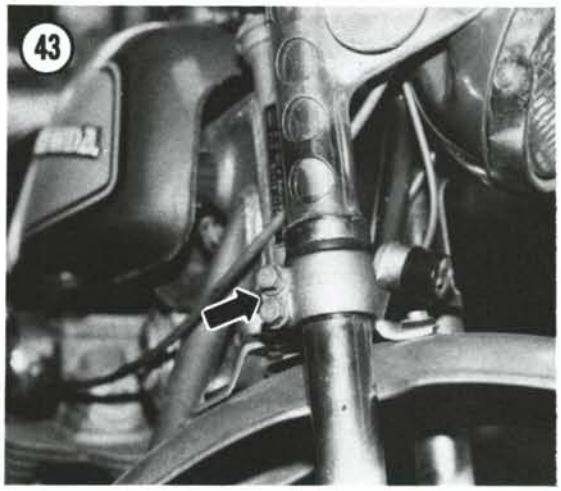


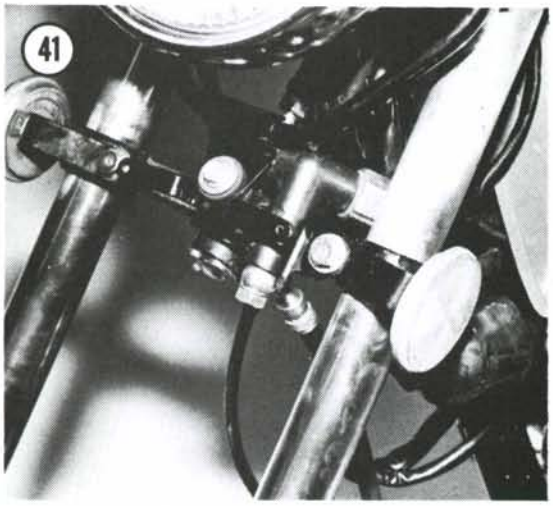


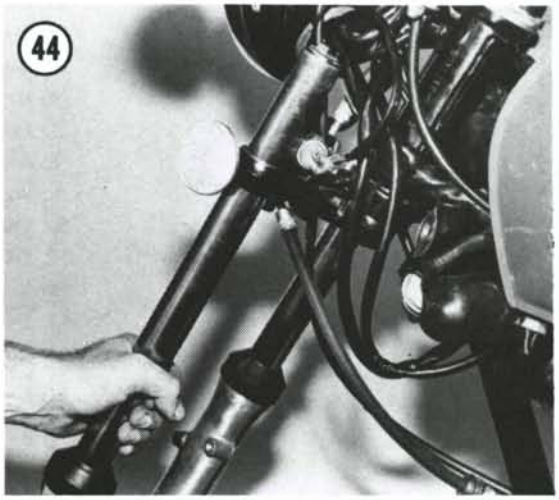

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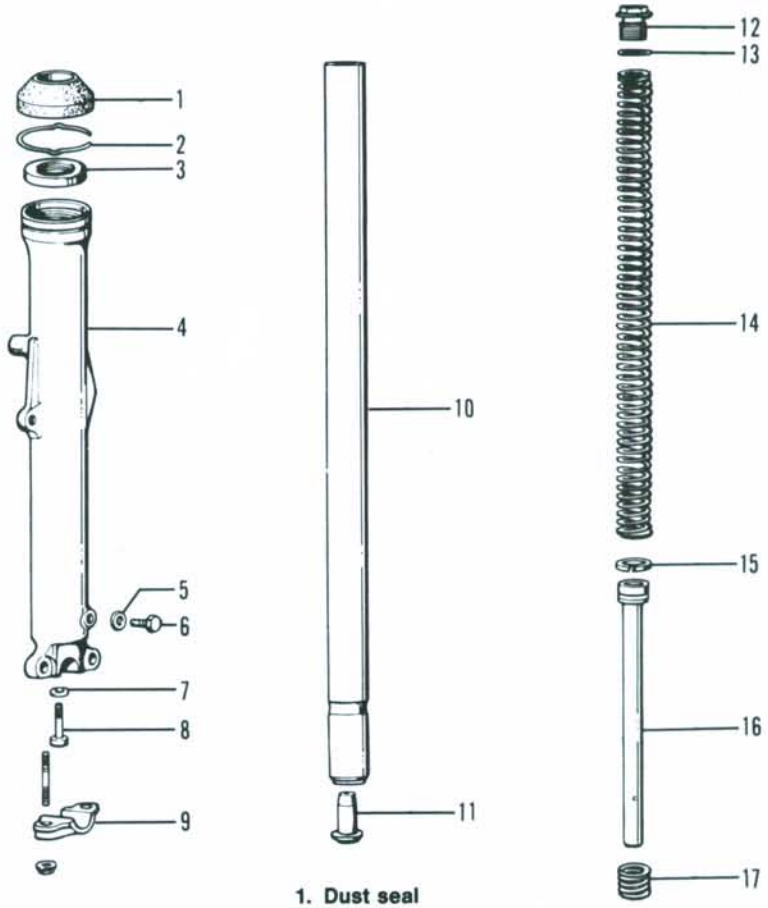

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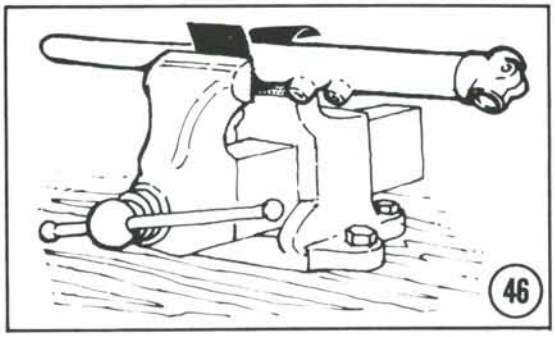

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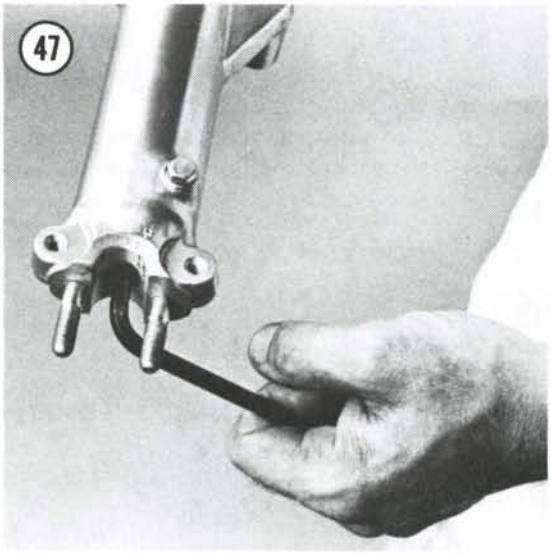
(45)

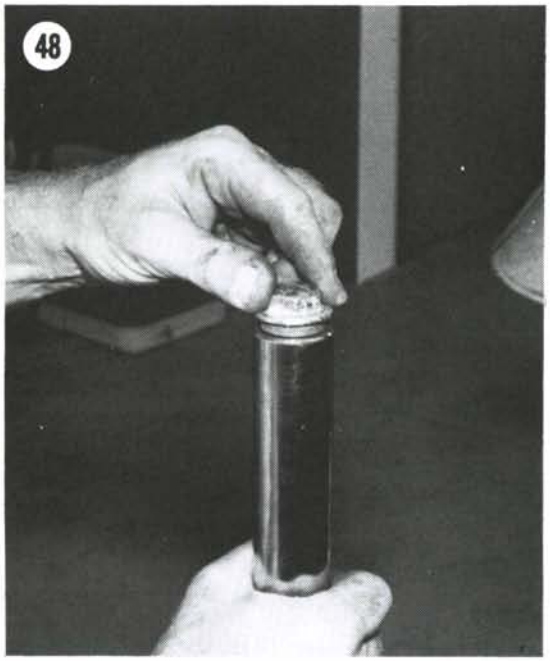
FRONT FORK ASSEMBLY

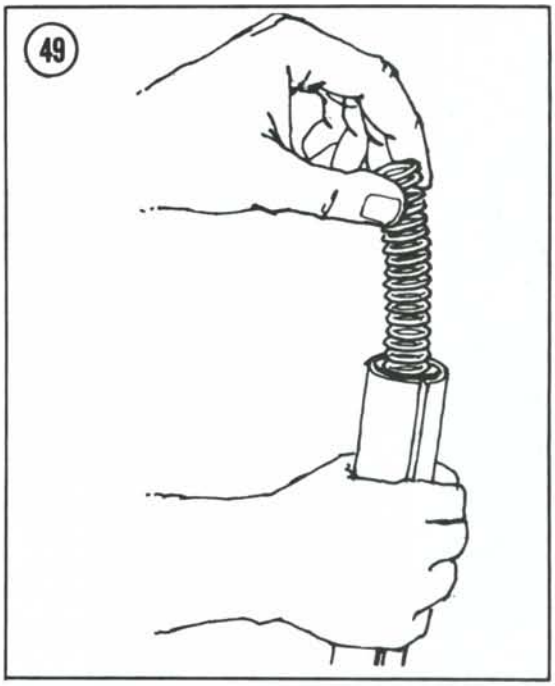


1. Dust seal
2. Circlip
3. Oil seal
4. Fork slider
5. Gasket
6. Drain bolt
7. Lockwasher
8. Allen screw
9. Axle holder
10. Fork tube
11. Oil lock piece
12. Top bolt
13. O-ring
14. Fork spring
15. Piston ring
16. Damper rod
17. Rebound spring









1. Slide the dust seal off of the fork tube.
2. Clamp the slider in a vise with soft jaws (**Figure 46**).
3. Remove the Allen head screw and gasket from the bottom of the slider (**Figure 47**).

NOTE

This screw has been secured with Loctite and is often very difficult to remove because the damper rod will turn inside the slider. It sometimes can be removed with an air impact driver. If you are unable to remove it, take the fork tubes to a dealer and have them remove the screws.

4. Hold the upper fork tube in a vise with soft jaws and loosen the top bolt.

WARNING

Be careful when removing the top bolt, as the spring is under pressure.

5. Remove the top bolt from the fork (**Figure 48**).
6. Remove the fork spring (**Figure 49**).
7. Remove the fork from the vise, pour the fork oil out and discard it. Pump the fork several times by hand to expel most of the remaining oil.

8. It may be necessary to slightly heat the area on the slider around the oil seal prior to removal. Use a rag soaked in hot water; do not apply a flame directly to the fork slider. Remove the circlip from the slider (**Figure 50**).
9. Remove the oil seal from the slider (**Figure 51**).
10. Pull the fork tube out of the slider.
11. Remove the oil lock piece, the damper rod and rebound spring.

Assembly

1. Coat all parts with fresh automatic transmission fluid or fork oil prior to installation.
2. Install the rebound spring onto the damper rod and insert this assembly into the fork tube.
3. Temporarily install the fork spring and top bolt to hold the damper rod in place.
4. Install the oil lock piece onto the damper rod and install the upper fork assembly into the slider.
5. Make sure the gasket is on the Allen head screw.
6. Apply Loctite Lock N' Seal to the threads of the Allen head screw prior to installation. Install it in the fork slider and tighten it securely.
7. Install a new oil seal. Drive the seal into the slider with Honda special tool Fork Seal Driver (part No. 07947-3330000) or suitable size socket. Drive the oil seal in until the groove in the slider can be seen above the top surface of the oil seal.
8. Install the circlip. Make sure that the circlip is completely seated in the groove in the slider.
9. Remove the top bolt and remove the spring installed in Step 3. Fill the fork tube with DEXRON automatic transmission fluid or SAE 10W fork oil. Refer to **Table 1** for the specific quantity for each fork leg.

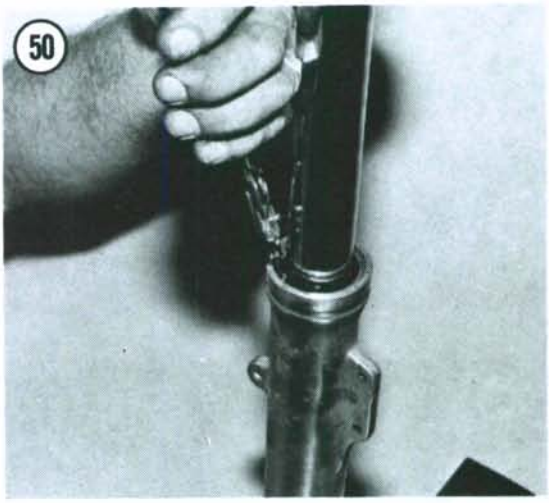
NOTE

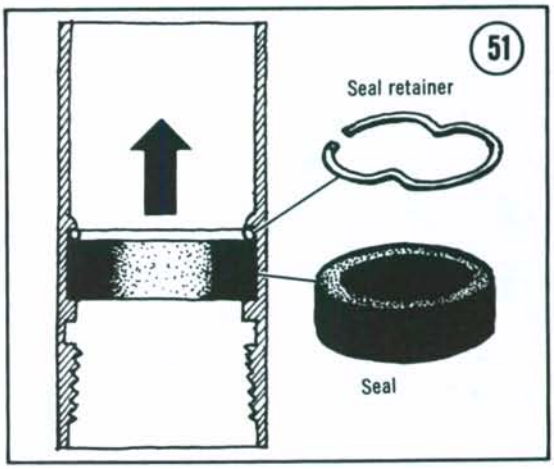
*In order to measure the correct amount of fluid, use a plastic baby bottle. These have graduations in fluid ounces (oz.) and cubic centimeters (cc) on the side (**Figure 52**).*

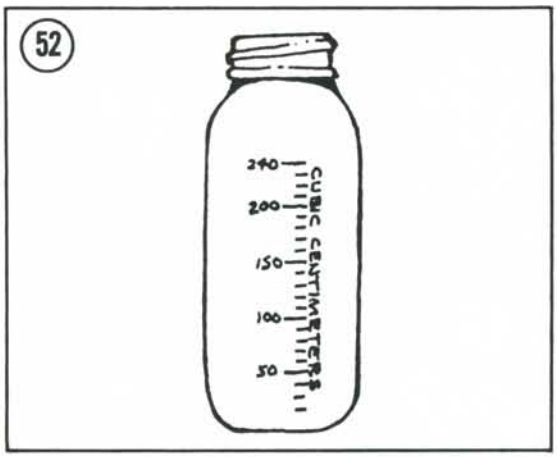
10. Install the spring into the fork assembly.
11. Inspect the O-ring seal on the top bolt; replace if necessary.
12. Install the top bolt (**Figure 48**). Tighten the top bolt to 18.1-21.7 ft.-lb. (1.8-2.5 mkg).
13. Install the rubber dust seal and snap it into position on the fork slider.
14. Repeat for the other fork assembly.
14. Install the fork assemblies as described in this chapter.

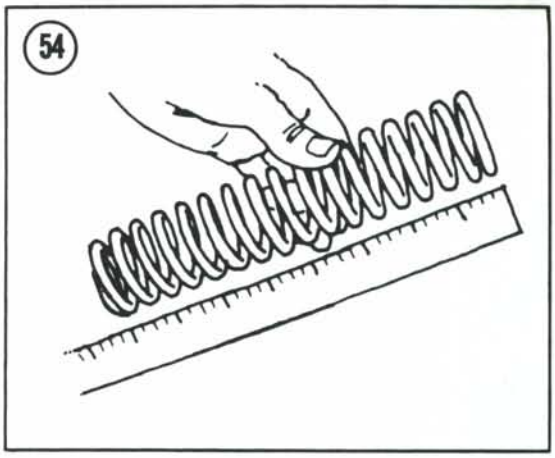
Inspection

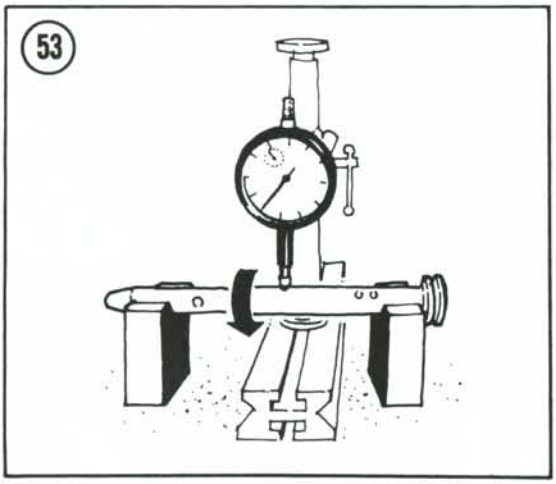
1. Thoroughly clean all parts in solvent and dry them. Check the fork tube for signs of wear or scratches.
2. Check the damper rod for straightness. **Figure 53** shows one method. The rod should

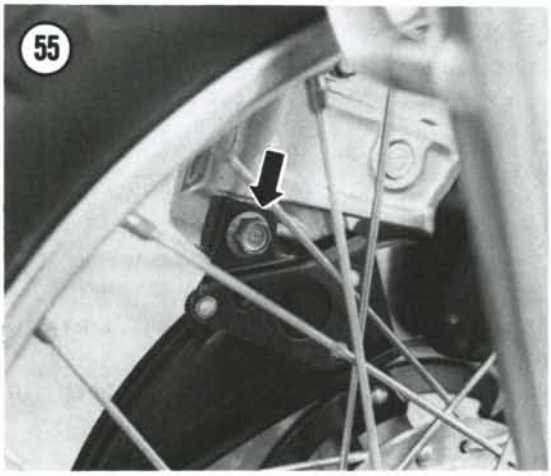












be replaced if the runout is 0.008 in. (0.2 mm) or greater.

3. Carefully check the damper rod and piston ring for wear or damage.

4. Check the upper fork tube for straightness. If bent or severely scratched, it should be replaced.

5. Check the lower slider for dents or exterior damage that may cause the upper fork tube to hang up during riding. Replace if necessary.

6. Measure the uncompressed length of the fork spring (not rebound spring) as shown in **Figure 54**. If the spring has sagged to 18.425 in. (468.0 mm) or less, it must be replaced.

7. Any parts that are worn or damaged should be replaced. Simply cleaning and reinstalling unserviceable components will not improve performance of the front suspension.

Installation

1. Install the forks by reversing the removal steps.

NOTE

*When installing the front fender on models with front disc brakes, the long bolts must go on the caliper side since they secure the caliper assembly to the fork as well as the fender (**Figure 55**).*

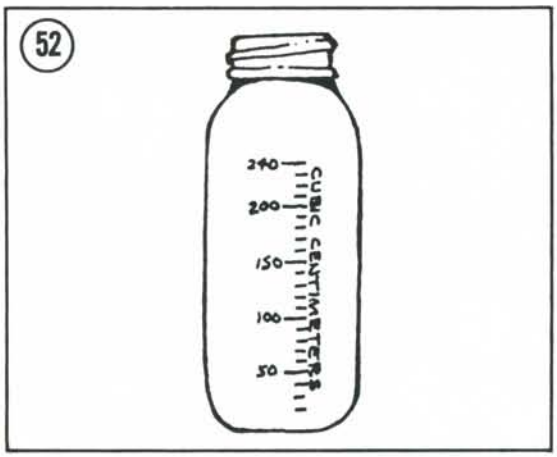
BRAKES

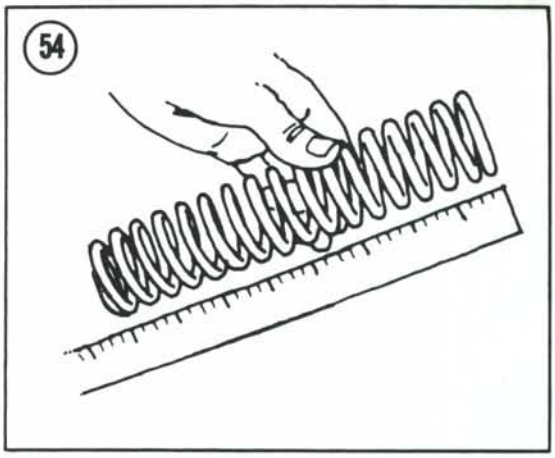
The front brake is either a drum type or disc, depending on models. On all models the rear brake is a drum type.

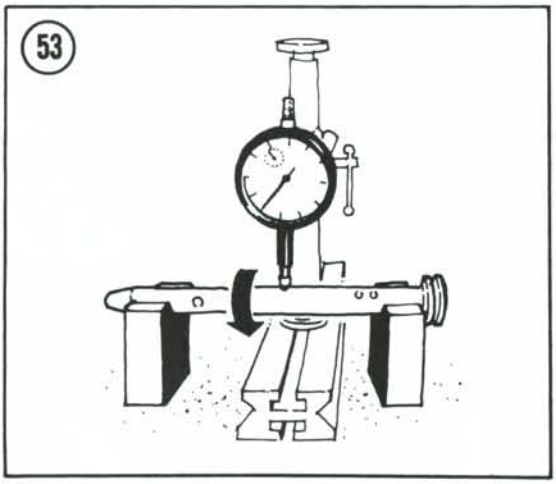
Disc Brake Caliper Removal

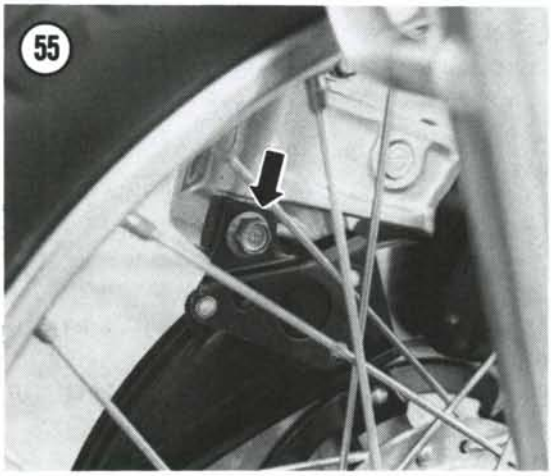
1. Remove the front wheel; refer to *Wheels* in this chapter.

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be replaced if the runout is 0.008 in. (0.2 mm) or greater.

3. Carefully check the damper rod and piston ring for wear or damage.

4. Check the upper fork tube for straightness. If bent or severely scratched, it should be replaced.

5. Check the lower slider for dents or exterior damage that may cause the upper fork tube to hang up during riding. Replace if necessary.

6. Measure the uncompressed length of the fork spring (not rebound spring) as shown in **Figure 54**. If the spring has sagged to 18.425 in. (468.0 mm) or less, it must be replaced.

7. Any parts that are worn or damaged should be replaced. Simply cleaning and reinstalling unserviceable components will not improve performance of the front suspension.

Installation

1. Install the forks by reversing the removal steps.

NOTE

*When installing the front fender on models with front disc brakes, the long bolts must go on the caliper side since they secure the caliper assembly to the fork as well as the fender (**Figure 55**).*

BRAKES

The front brake is either a drum type or disc, depending on models. On all models the rear brake is a drum type.

Disc Brake Caliper Removal

1. Remove the front wheel; refer to *Wheels* in this chapter.

2. Disconnect hydraulic brake line from brake caliper (**Figure 56**).
3. Remove brake caliper retaining bolts and remove caliper (**Figure 57**).

Disc Brake Caliper Disassembly/Assembly

1. Disassemble caliper to the stage shown in **Figure 58**.
2. Remove bolts shown in **Figure 59**. Hold caliper link in a vise.
3. Remove pin on back of the fixed brake pad and remove the pad (**Figure 60**). Check pad to be sure it is not worn to the red warning line. If it is, replace all pads in a set.
4. Remove the movable pad (**Figure 61**). Check it for wear as in the previous step.
5. Install new pads and reassemble caliper by reversing the preceding steps.

Disc Brake Caliper Installation

1. Install the brake caliper retaining bolts; refer to **Figure 57**.
2. Connect the hydraulic brake line to the caliper; refer to **Figure 56**.
3. Install the front wheel; refer to *Wheel*, in this chapter.
4. Bleed the hydraulic brake system; refer to *Brake Bleeding*, following.

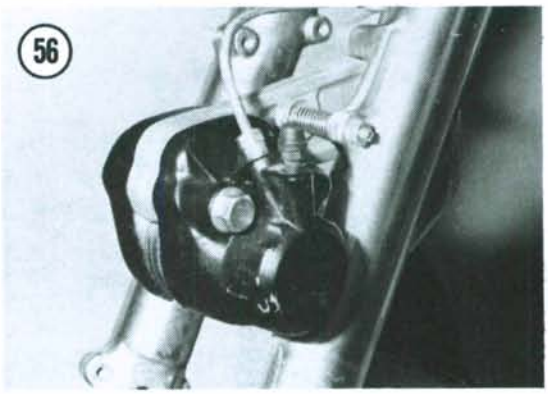
Disc Brake Caliper Adjustment

Each time the brake pads are replaced the caliper position must be adjusted to maintain clearance between the fixed brake pad and the rotor. With the front wheel off the ground, loosen the caliper stopper bolt locknut (**Figure 62**). Turn the stopper bolt counterclockwise until the brake pad drags against the rotor. Turn the stopper bolt clockwise while spinning the wheel until the brake pad just clears the rotor. Then turn the stopper bolt 1/2 turn clockwise and tighten the locknut.

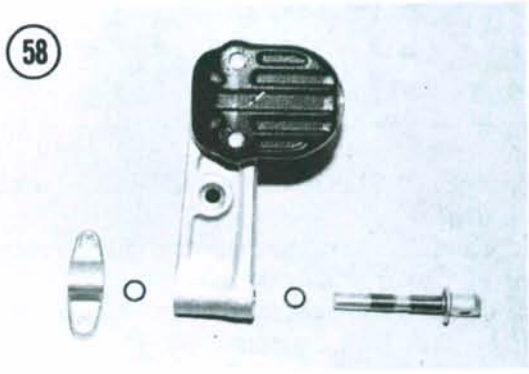
Brake Bleeding

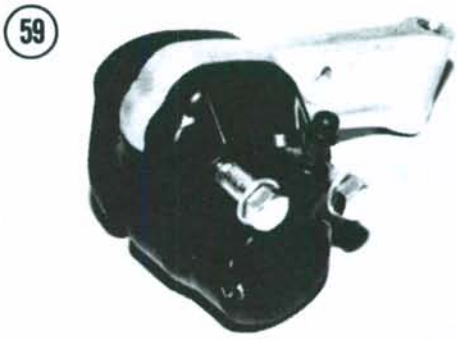
The brake system must be bled any time air enters the system. Air may enter when the bleeder valve is open or if the reservoir fluid level becomes too low.

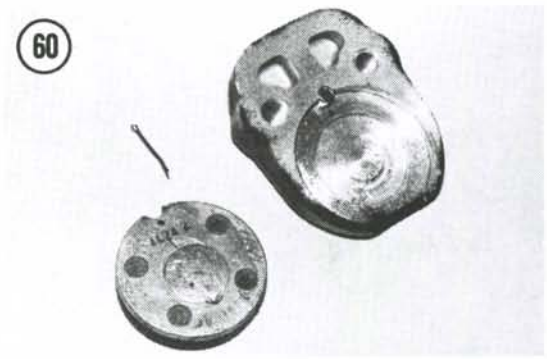
1. Fill the brake fluid reservoir with fresh fluid. Check the level frequently during the bleeding procedure as some fluid will be lost.

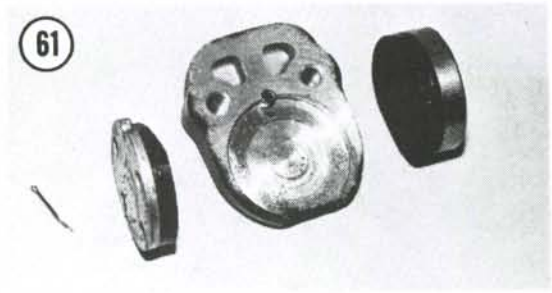


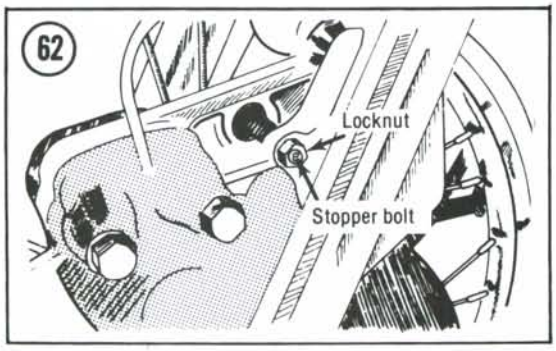


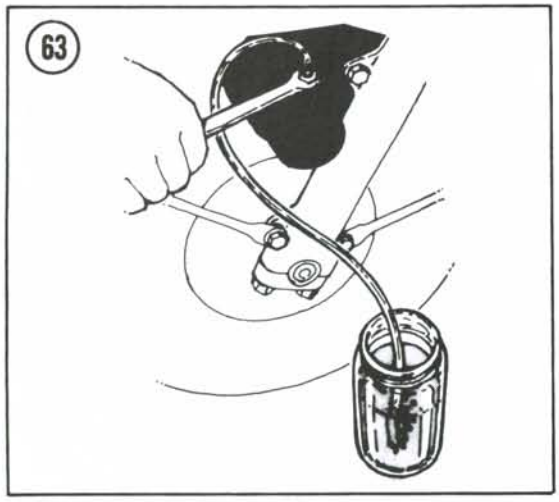








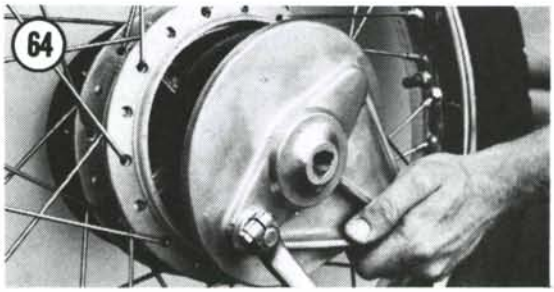


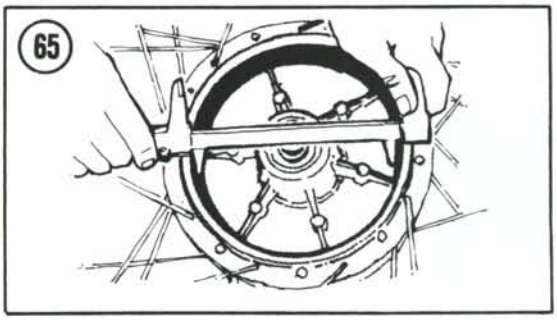


2. Remove the rubber cap from the bleeder valve then connect a length of clear plastic tubing to the bleeder valve (**Figure 63**). Place the other end of the tube into a clean jar containing brake fluid. Be sure that the end of the tubing remains submerged in brake fluid during the entire procedure.
3. Open the bleeder valve, squeeze the brake lever slowly, close the valve and release the lever. Repeat this sequence several times until the tube is full of fluid.
4. Open the bleeder valve and continue to slowly squeeze and release the lever until no bubbles appear in either the brake fluid reservoir or in the fluid flowing from the bleeder valve. Add brake fluid to the reservoir as necessary to maintain the proper level.
5. Close the bleeder valve, install the rubber cap and fill the reservoir to the line.

Drum Brake (Front and Rear)
Removal/Installation

1. Remove rear wheel; refer to *Wheels* in this chapter.
2. Pull brake assembly out as shown in **Figure 64**.
3. Measure the brake drum inner diameter with a vernier caliper (**Figure 65**). Replace if





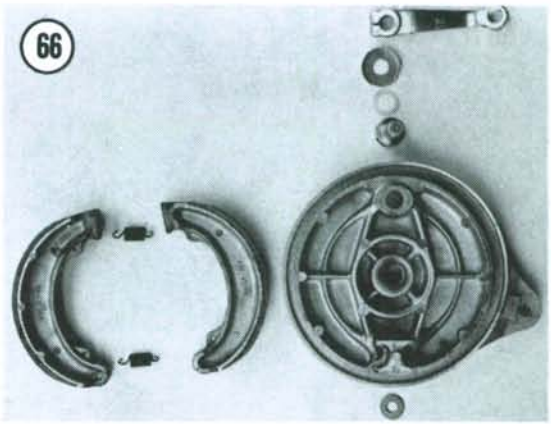
brake drum is worn beyond service limits recommended in **Table 2**. Also measure brake lining thickness and replace if worn to less than the wear limits specified in **Table 3**.

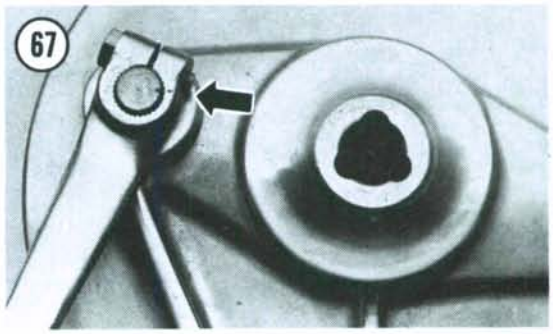
4. To replace brake shoes, refer to **Figure 66**. Remove the cotter pin, washer, springs and brake shoes. Reverse disassembly procedure to reassemble the brake assembly.

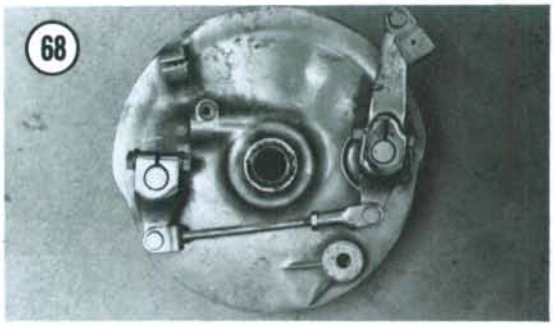
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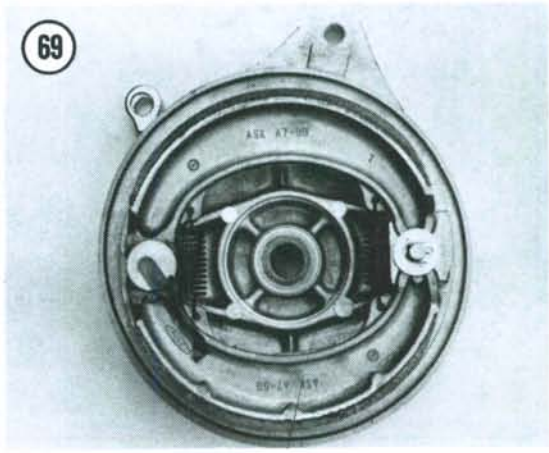
*If brake arms have been removed, be sure that the punch marks on the brake arm align with corresponding mark on brake cam (**Figure 67**).*

5. **Figure 68** and **Figure 69** show the brake completely assembled.
6. To install the brake assembly and rear wheel, reverse the preceding Steps 1 and 2.









REAR SUSPENSION

The major rear suspension components are two shock absorbers, two springs and a swinging arm.

Shock Absorbers and Springs

The rear shock absorbers are not serviceable and must be replaced in the event of malfunction.

1. Remove shock absorber mounting bolts (**Figure 70**) and pull shock absorbers off.
2. Compress the shock absorber with a special spring compressor as shown in **Figure 71**, until the spring seat can be removed; release pressure from the tool.
3. Reverse the preceding steps to install the new shock absorbers.

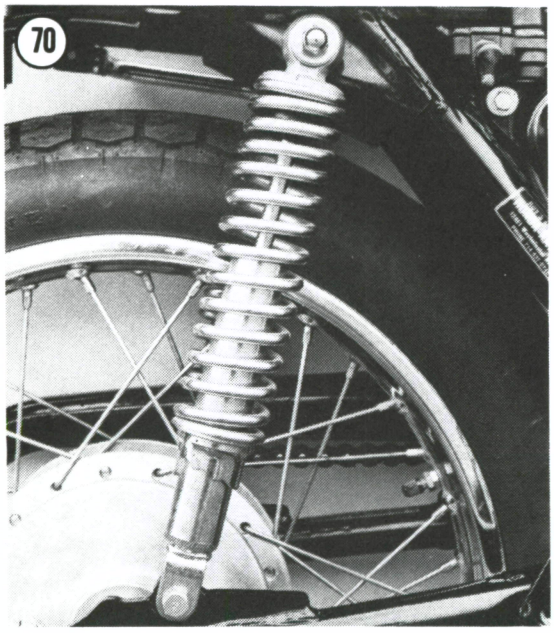
Swinging Arm

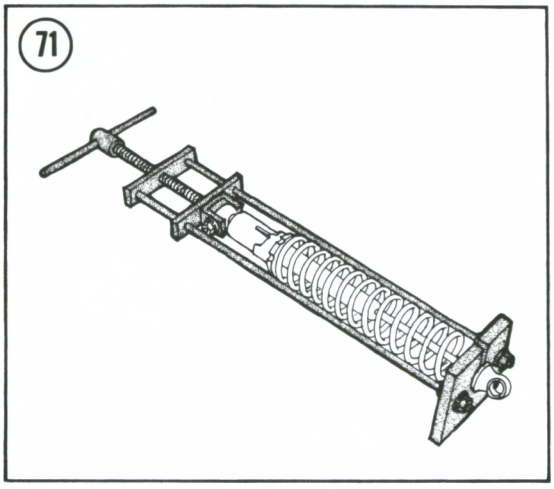
The pivot section of the swinging arm is susceptible to wear, especially in the shaft and bushings. Replace the pivot shaft if it is bent more than 0.02 in. (0.5 mm). Replace bushings and/or shaft if the clearance between them exceeds 0.014 in. (0.35 mm).

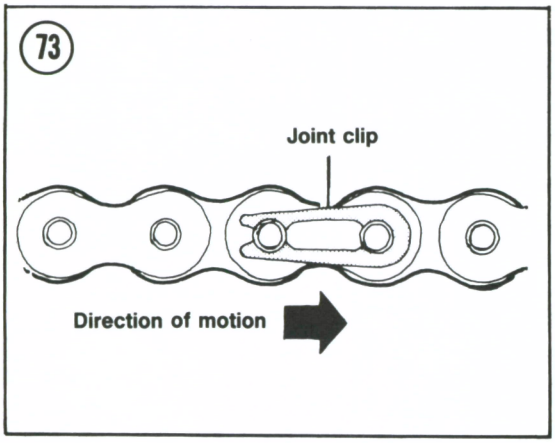
Disassemble the swinging arm and grease its pivot shaft and bushings every 6,000 miles (9,000 kilometers). Refer to **Figure 72** for the following procedure:

1. Remove hex nut, washer and dust seal cap.
2. Slide pivot bolt out of center collar.

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3. Remove center collar. Grease inside of the pivot bush, inside and outside of center collar and outside of pivot bolt.
4. Reassemble by reversing the preceding steps.

DRIVE CHAIN

The drive chain becomes worn after prolonged use. Wear in pins, bushings and rollers causes chain stretch. Sliding action between roller surfaces and sprocket teeth also contribute to wear.

Cleaning and Adjustment

1. Disconnect the master link (**Figure 73**) and remove chain.

2. Clean chain thoroughly in solvent.

3. Rinse chain with clean solvent, then blow dry with compressed air.

4. Examine chain carefully for wear or damage. Replace if there is any doubt as to its condition. If chain is okay, lubricate by soaking in oil or any of the special chain lubricants available in motorcycle shops.

5. Install the chain. Be sure that the master link is installed as shown in **Figure 73**.

6. Refer to **Figure 74**. Adjust the chain as follows:
   a. Remove cotter pin and loosen rear axle nut.
   b. Loosen locknut on each side.
   c. There is one adjustment bolt on each side. Turn it until there is 3/4-1 in. (20-25 mm) of up and down movement in the center of the lower chain run (**Figure 75**).
   d. Be sure that the reference marks on the swinging arm and the index mark on the chain adjuster are in the same relative positions on each side. Refer to **Figure 74**.

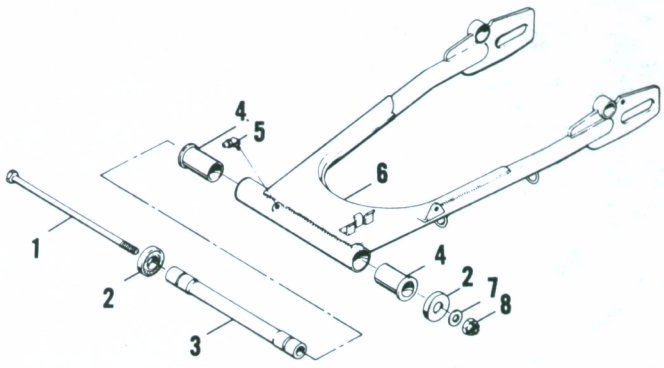
7. Tighten the rear axle nut, then install a new cotter pin (refer to **Figure 74**).

8. Adjust the rear brake as described in Chapter Three.

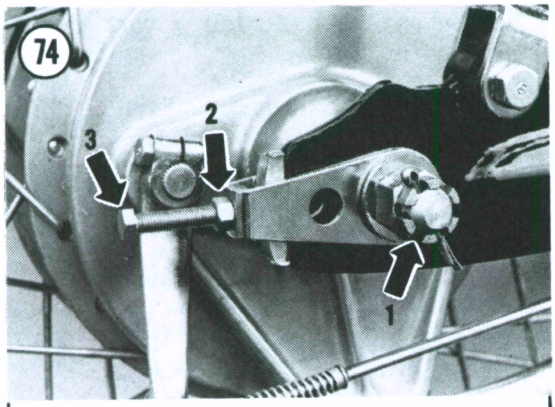
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SWING ARM

1. Pivot bolt
2. Dust seal
3. Pivot collar
4. Bushing
5. Grease fitting
6. Swing arm assembly
7. Washer
8. Hex nut



74



1. Axle nut 2. Locknut 3. Adjuster

75

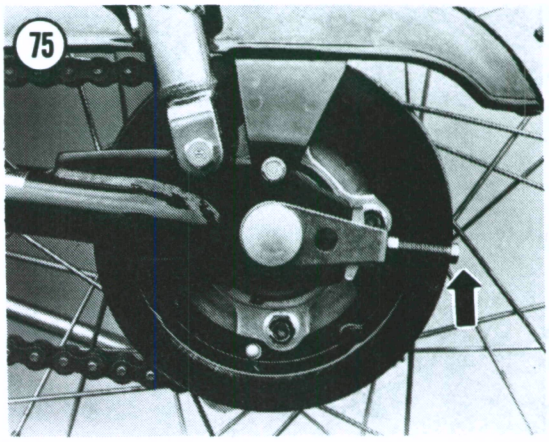


Table 1 FORK OIL CAPACITY

Model	oz.	cc
250, 360	4.6-4.7	135-140

Table 2 BRAKE DRUM SERVICE LIMITS

Model	Service limits	
	in.	mm
250, 360		
Front	7.17	182
Rear	6.38	162

Table 3 BRAKE LINING WEAR LIMITS

Model	Service limits	
	in.	mm
250, 360		
Front	0.12	3.0
Rear	0.12	3.0

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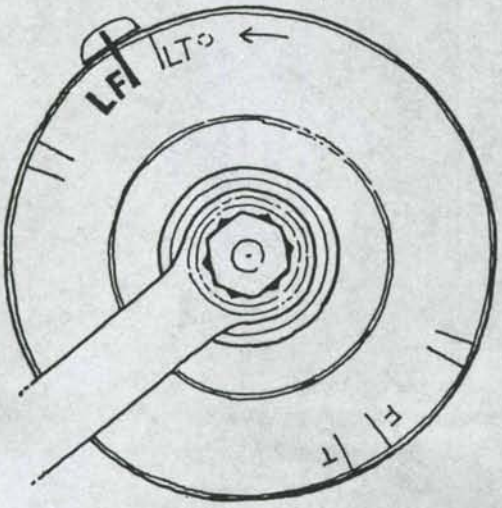
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QUICK REFERENCE DATA



IGNITION TIMING

The "LF" mark on the alternator rotor must align with the index pointer just as the left-hand ignition breaker points begin to open. The right-hand ignition breaker points should just begin to open as the "F" mark and index pointer align.

ENGINE OIL GRADE

Temperature Range	Oil Viscosity
Below 32°F	10W, 10W-30, or 10W-40
32 to 60°F	20W, 10W-30, or 10W-40
Above 60°F	30W, 10W-30, or 10W-40

ADJUSTMENTS

Adjustment	Measurement
Drive chain play	3/4-1 in. (20-25mm)
Front brake lever free play	3/16-5/16 in. (5-8mm)
Rear brake pedal free play	3/4-1 in. (20-25mm)
Clutch lever free play	3/4 in. (20mm)

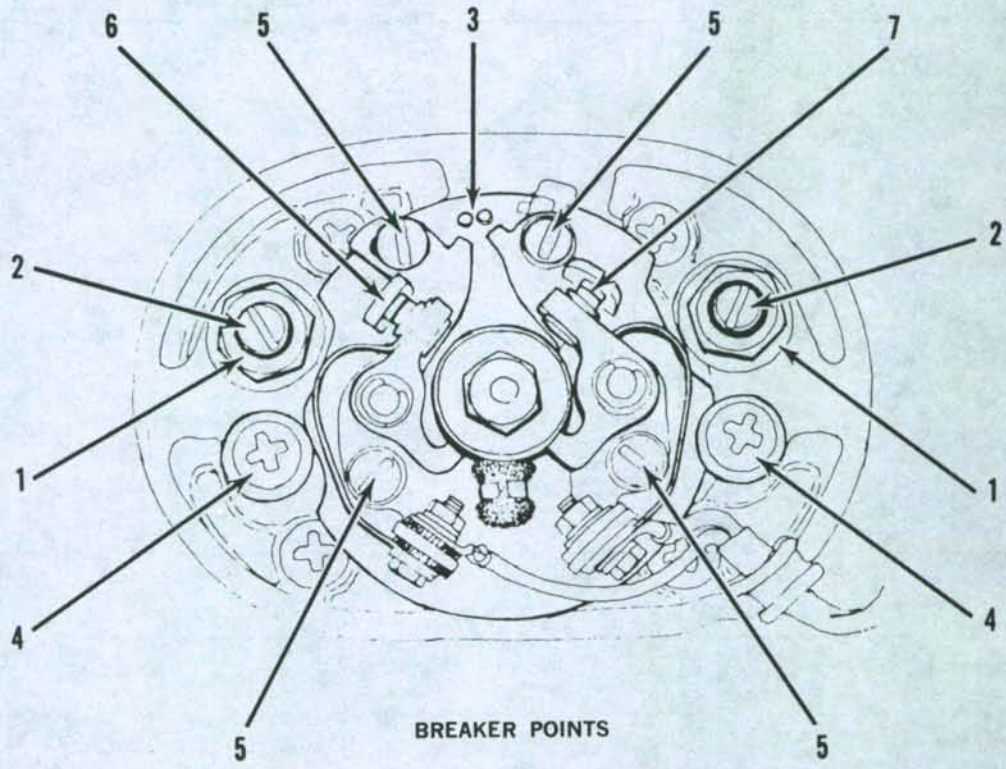
TUNE-UP SPECIFICATIONS AND CAPACITIES

	U.S.	Metric
Breaker point gap	0.012-0.016 in.	0.3-0.4 mm
Spark plug gap	0.28-0.32 in.	0.7-0.8 mm
Valve clearance*		
Intake	0.002 in.	0.05 mm
Exhaust	0.003 in.	0.08 mm
Carburetor float height	0.75 in.	18.5 mm
Engine oil capacity	3.2 pints	1.5 liters
Fork oil capacity	4.6-4.7 oz.	135-140 cc

* Valve clearance must be checked with the engine cold.

TIRE INFLATION PRESSURE

Tire size	Inflation pressure	
	psi	kg/cm^2
3.00 x 18-4PR	26	1.8
3.50 x 18-4PR	28	2.0
3.00S x 18-4PR	25	1.75
3.50S x 18-4PR	28	2.0



BREAKER POINTS

1. Locknut
2. Adjuster
3. Pry slots
4. Base plate retaining screws
5. Breaker points retaining screws
6. Left cylinder points
7. Right cylinder points

MAINTENANCE SCHEDULE

Maintenance Item	Miles 1,000	3,000	6,000
Engine tune-up		X	
Check battery	X		
Change oil	X	X	X
Service oil filter			X
Adjust clutch		X	
Check lights and horn	X		
Adjust chain	X		
Adjust brakes	X		
Check brake lining			X
Check wheels	X		
Check tires	X		
Change fork oil		X	
Grease wheel bearings			X
Check steering bearings			X
Grease swing arm		X	

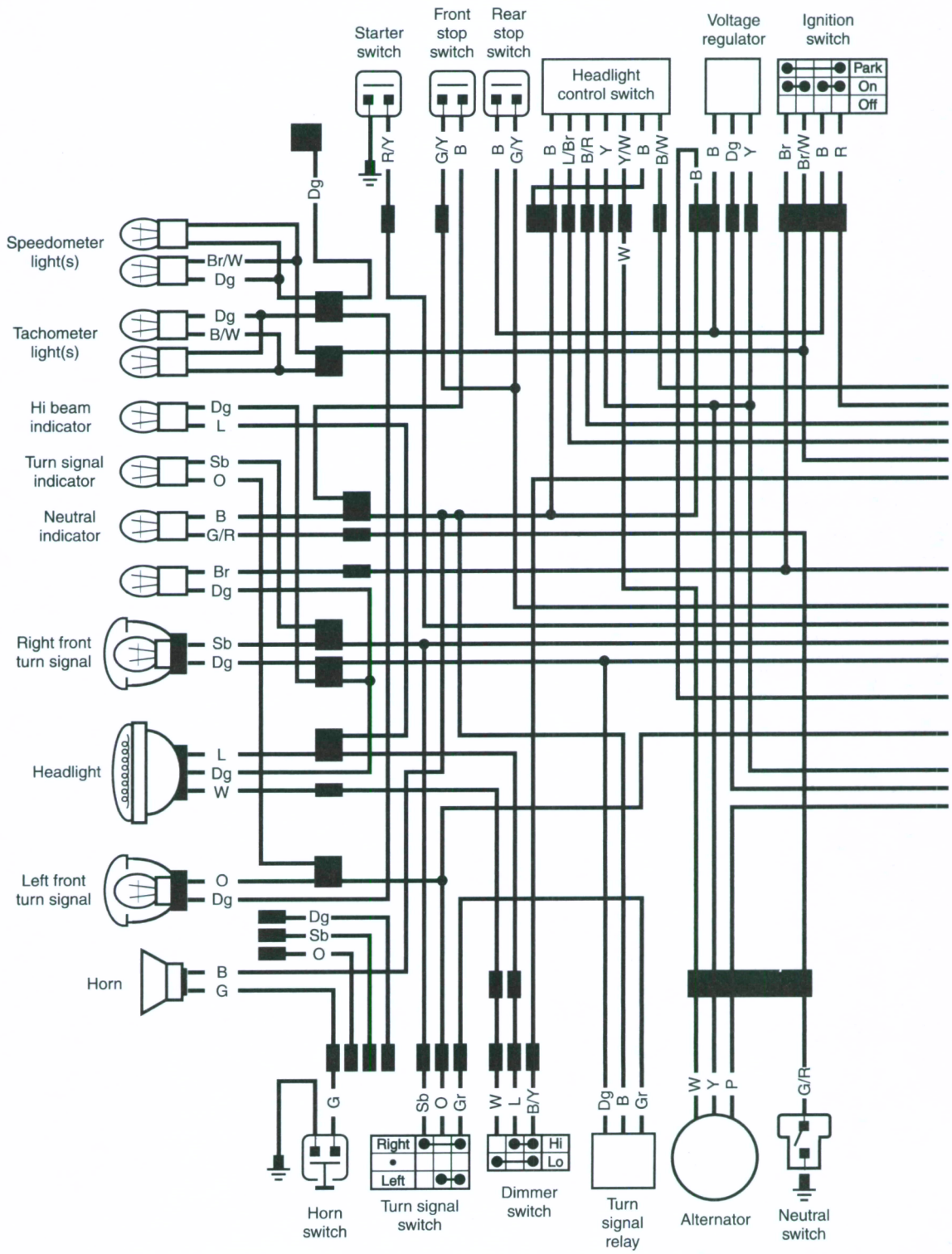
IGNITION - NO SPARK/WEAK SPARK

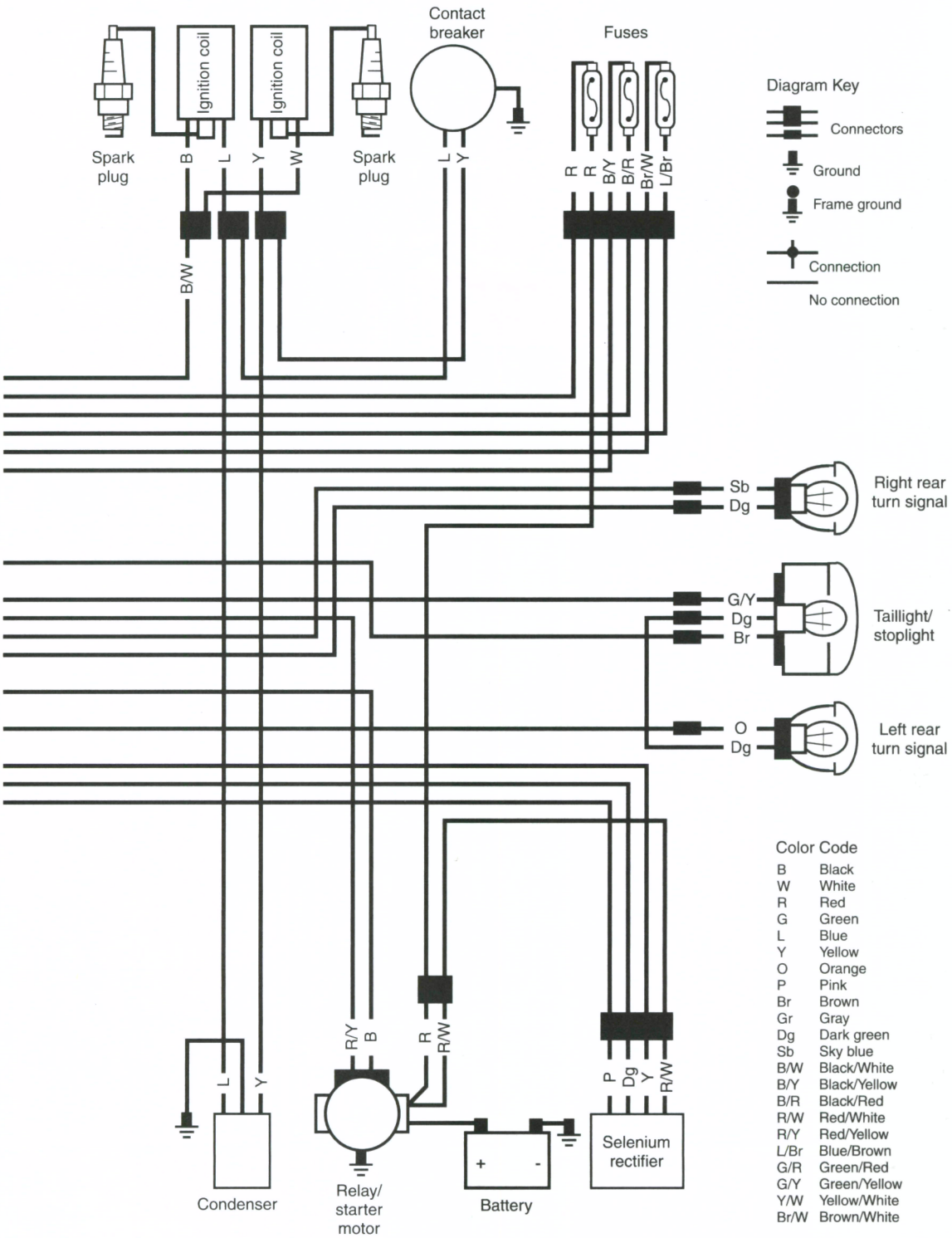
Probable Cause	Remedy
• Discharged battery	Charge battery
• Defective fuse	Replace
• Defective main switch	Replace
• Loose or corroded connections	Clean and tighten
• Broken wire	Repair
• Incorrect point gap	Reset points. Be sure to readjust ignition timing
• Dirty or oily points	Clean points
• Spark plug lead damaged	Replace wire
• Broken primary wire	Repair wire
• Open winding in coil	Replace coil
• Shorted winding in coil	Replace coil
• Defective condenser	Replace condenser

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WIRING DIAGRAMS

HONDA CB250GS, CJ250, CB360, CB360G, CJ360T, CL360




Contact breaker
Fuses
Spark plug
Ignition coil
Ignition coil
Spark plug
B
L
Y
W
L
Y
R
R
B/Y
B/R
Br/W
L/Br
B/W
Diagram Key
Connectors
Ground
Frame ground
Connection
No connection
Sb
Dg
Right rear turn signal
G/Y
Dg
Br
Taillight/ stoplight
O
Dg
Left rear turn signal
R/Y
B
R
R/W
P
Dg
Y
R/W
L
Y
Condenser
Relay/ starter motor
+
-
Battery
Selenium rectifier
Color Code
B Black
W White
R Red
G Green
L Blue
Y Yellow
O Orange
P Pink
Br Brown
Gr Gray
Dg Dark green
Sb Sky blue
B/W Black/White
B/Y Black/Yellow
B/R Black/Red
R/W Red/White
R/Y Red/Yellow
L/Br Blue/Brown
G/R Green/Red
G/Y Green/Yellow
Y/W Yellow/White
Br/W Brown/White

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